

Workshop Manual

Octavia II 2004 ➤

Octavia II 2010 ➤

2.0/125 kW TDI PD Engine

Engine ID	BMN								
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Edition 03.2018

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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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00 – Technical data

1 Technical data

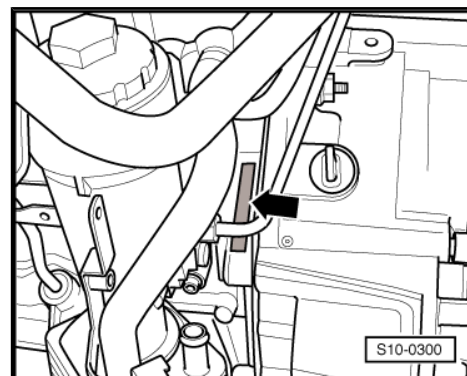
(SRL001193; Edition 03.2018)

1.1 Engine number

The engine number ("engine identification characters" and "serial number") is located at the front at the engine/gearbox joint -arrow-.

In addition, a sticker with the "engine identification characters" and "serial number" is attached to the timing belt guard.

The engine identification characters are also indicated on the vehicle data sticker.



1.2 Engine characteristics

Engine codes	BMN
Manufactured	07.06 ► 05.08
Emission standards conforming to	EU4
Displacement l	1.968
Output kW at rpm	125/4200
Torque Nm at rpm	350/1800
Bore Ø mm	81.0
Stroke mm	95.5
Number of valves per cylinder	4
Compression ratio	18.5 : 1
Firing order	1-3-4-2
Catalytic converter	yes
Exhaust gas recirculation with radiator	yes
Turbocharging	yes
Charge air cooler	yes
Diesel particle filter	yes

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01 – Self-diagnosis

1 Self diagnosis, safety measures, cleanliness regulations and directions

1.1 Self-diagnosis

This Rep.-Gr. is deleted.

For this use the "Vehicle self-diagnosis", "Measuring method" and "Fault finding" ⇒ Vehicle diagnostic tester.

1.2 Supplementary instructions and assembly work on vehicles with an air conditioning system



WARNING

Do not open the refrigerant circuit of the air conditioning system.



Note

To avoid causing damage to the condenser and to the refrigerant lines and hoses make sure the lines and hoses are not over-extended, kinked or bent.

Steps which should be taken in order to remove and install the engine without opening the refrigerant circuit:

- Unscrew the retaining clip(s) on the refrigerant lines.
- Remove V-ribbed belt ⇒ [page 21](#) .
- Remove AC compressor from the bracket for auxiliary units
⇒ [page 21](#) .
- Mount the air conditioning compressor and the condenser in such a way that the refrigerant lines/hoses are not under tension.

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1.3 Safety precautions when working on fuel supply system



WARNING

- ◆ *On vehicles with engine with unit injectors, the temperature of the fuel lines or of the fuel can be up to 100 °C in an extreme case. Let the fuel cool down before opening the lines, as otherwise there is a high risk of burning.*
- ◆ *The fuel system is under pressure!*
- ◆ *Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel.*
- ◆ *Place cleaning cloths around the connection point before detaching cable connections. Reduce pressure by carefully removing the wiring.*

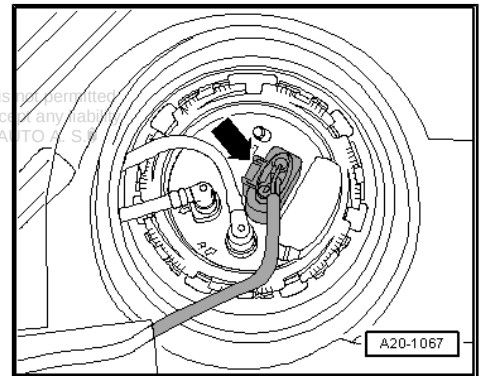
- ◆ Fuel pump is activated by switching on ignition and via driver door contact switch. Before opening the fuel system and for reasons of safety, if the battery is not disconnected, the connector -arrow- must be disconnected from the fuel delivery unit.



WARNING

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *Ensure that there is adequate free access to all moving or hot components.*



When removing and installing the fuel gauge transmitter or the fuel delivery unit from a full or partly filled fuel tank, pay attention to the following points:

- ◆ The extraction hose of an exhaust extraction system which is switched on, must be positioned close to the assembly opening of the fuel tank in order to extract the released fuel vapours, even before the work is commenced. If no exhaust extraction system is available, a radial fan (motor not in air flow of fan) with a delivery volume of more than 15 m³/h must be used.
- ◆ Prevent skin contact with fuel! Wear fuel-resistant gloves!

1.4 Safety precautions when working on the diesel direct injection system

Note the following if testers and measuring instruments have to be used during a road test:

- ◆ Always secure the test and measuring devices on the rear seat and have a second person operate them there.

If the test and measuring devices are operated from the passenger seat, the passenger could be injured by the release of the passenger airbag in the event of an accident.



WARNING

Secure the diagnostic device to the rear seat and operate from that position.

Observe the following points to prevent injury to persons and/or damage to the injection and preheating system:

- ◆ Disconnect and connect wires of the preheating and injection system as well as measuring device wires when the ignition is switched off.
- ◆ If the engine should be run at the starter speed without it actually igniting, then separate the central plug connection for the unit injector at the cylinder head.
- ◆ Before disconnecting the battery determine the code of the radio fitted with anti-theft coding.
- ◆ Switch off the ignition before connecting or disconnecting the battery as this could otherwise damage the diesel direct injection system control unit.
- ◆ After connecting the battery, carry out certain additional operations ⇒ Electrical System ⇒ Rep. gr. 27 .

1.5 Regulations concerning cleanliness when working on the fuel supply/fuel injection system

When working on the fuel supply and injection system, pay careful attention to the following "6 rules" for cleanliness:

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover. Use lint-free cloths!
- ◆ Carefully cover or close opened components if the repair is not completed immediately.
- ◆ Only install clean parts: remove spare parts from their wrapping immediately before fitting. Do not use any parts which have been stored unwrapped (e.g. on a shelf or in a tool box).
- ◆ When the system is opened: Avoid using compressed air. Avoid moving the vehicle.
- ◆ Also make sure no diesel fuel runs onto the coolant hoses. If this is the case clean the hoses immediately. Replace immediately any hoses which have suffered damage.

1.6 Regulations concerning cleanliness when working on the exhaust gas turbocharger

Carefully observe the following "5 rules" for cleanliness when working on the exhaust gas turbocharger:

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover. Use lint-free cloths!
- ◆ Carefully cover or close opened components if the repair is not completed immediately.

- ◆ Only install clean parts: remove spare parts from their wrapping immediately before fitting. Do not use any parts which have been stored unwrapped (e.g. on a shelf or in a tool box).
- ◆ When the system is opened: Avoid using compressed air. Avoid moving the vehicle.

1.7 General instructions for charge air system



WARNING

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *Ensure that there is adequate free access to all moving or hot components.*



Caution

In case a mechanical damage to the exhaust gas turbocharger is found, e.g. damage to the compressor wheel, it is not sufficient to only replace the turbocharger. In order to avoid consequential damage, the following tasks must be performed:

- ◆ *Clean all oil lines.*
- ◆ *Change engine oil and oil filter.*
- ◆ *Check air filter housing, air filter element and charge air pipes as well as charge air hoses for soiling.*
- ◆ *Check all the air guides and the charge air cooler for foreign bodies.*

If foreign bodies are detected in the charge air system, the complete charge-air routing must be cleaned and if necessary the charge air cooler must also be replaced.

- ◆ The charge-air system must be tight, check ➔ [page 131](#) .
- ◆ Replace self-locking nuts.
- ◆ Hose connections and hoses for the charge air system must be free of oil and grease before being installed. Only seals and sealing surfaces of the quick couplings are coated with oil ➔ [page 130](#) .
- ◆ Observe markings on the hoses and components.
- ◆ All hose connections of the charge air system are secured with spring strap clamps or push-fit couplings.
- ◆ Only install approved clamps for securing the hose connections ➔ Electronic Catalogue of Original Parts .
- ◆ Spring-type clip pliers are recommended for installation of spring-type clips.
- ◆ Assembly of hose connections with push-fit couplings ➔ [page 130](#) .



- ◆ Before screwing down the oil feed line, fill the exhaust turbo-charger via the connection fitting with engine oil.
- ◆ To ensure the oil supply to the exhaust gas turbocharger, leave the engine running for about 1 minute after installing the exhaust gas turbocharger.

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10 – Removing and installing engine

1 Removing and installing engine

1.1 Removing engine

Special tools and workshop equipment required

- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Engine/gearbox jack , e.g. -V.A.G 1383 A-
- ◆ Engine mount - T10012-
- ◆ Workshop crane , e.g. -VAS 6100-
- ◆ Double ladder , e.g. -VAS 5085-
- ◆ Pliers for spring-type clips
- Enquire the event memories of all control units prior to engine removal ⇒ Vehicle diagnostic tester.



Note

- ◆ *The engine is removed downwards together with the gearbox.*
- ◆ *All cable straps that have been loosened or cut open when the engine was removed must be attached again in the same location when the engine is installed again.*
- ◆ *Leave the ignition key in the ignition lock so that the steering lock does not click into place.*
- ◆ *Collect drained coolant in a clean container for reuse or proper disposal.*



Caution

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

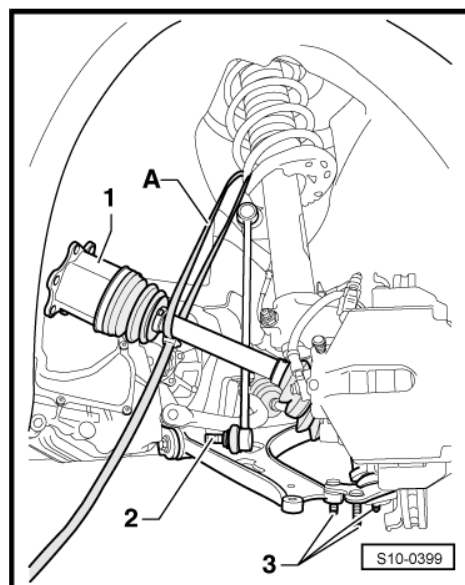
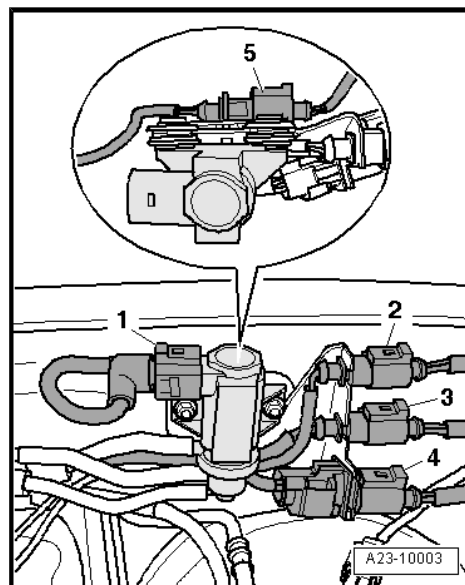
- ◆ **Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.**
- ◆ **To avoid damage to lines/wiring, ensure sufficient clearance to all moving or hot components.**

Observe all safety measures and notes for assembly work on the fuel supply and injection system, at the charge air system and observe as well the rules for cleanliness ⇒ [page 2](#) .

- Before disconnecting the battery, if necessary remove the adapter for the anti-theft wheel bolts from the luggage compartment.
- Disconnect the battery-earth strap with the ignition off ⇒ Electrical System ⇒ Rep. gr. 27 .
- Remove engine cover ⇒ [page 13](#) .
- Remove air filter with air mass meter - G70- and inlet hose ⇒ [page 148](#) .



- Remove battery and battery tray ⇒ Electrical System ⇒ Rep. gr. 27 .
- Disconnect the following connectors on the bulkhead and expose the cable:
 - 1 - Connector (black) for solenoid valve for charge pressure control - N75-
 - 2 - Plug (orange) for exhaust gas temperature sender 3 - G495- (temperature sender downstream particle filter - G527-)
 - 3 - Plug (black) for exhaust gas temperature sender 1 - G235- (temperature sender upstream of turbocharger - G507-)
 - 4 - Plug (black) for lambda probe - G39- with heating for lambda probe - Z19-
 - 5 - Plug (brown) for exhaust gas temperature sender 2 - G448- (temperature sender upstream of particle filter - G506-)
- Remove plenum chamber cover and bulkhead plenum chamber ⇒ Body Work ⇒ Rep. gr. 66 .
- Slacken the screw for the front right drive shaft only by maximum 90°, otherwise the wheel bearing may be damaged.
- Remove both front wheels ⇒ Chassis ⇒ Rep. gr. 44 .
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Remove bottom part of right wheelhouse liner ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove right drive shaft ⇒ Chassis ⇒ Rep. gr. 40 .
- Unscrew left drive shaft from gearbox flange.
- Unscrew the nut from the left coupling rod -2- and press off the coupling rod from the anti-roll bar.
- Unscrew the nuts from the left steering joint -3- and press the steering joint out of the suspension arm.
- If present, unscrew coupling rod from front left vehicle level sensor - G78- .
- Turn the steering to full left lock.
- Swivel the steering joint outwards and secure the drive shaft -1- with a band -A- in the wheelhouse.
- Insert a pin screw in the suspension arm in order to stabilize the steering joint.
- Remove charge air hose on right and left between charge air cooler and charge air pipe ⇒ [page 128](#) .



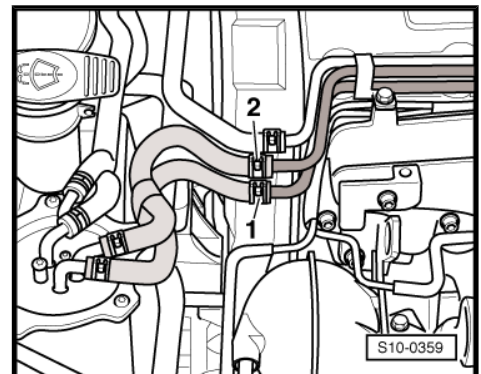
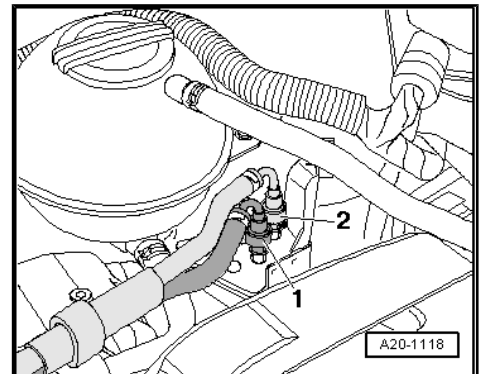
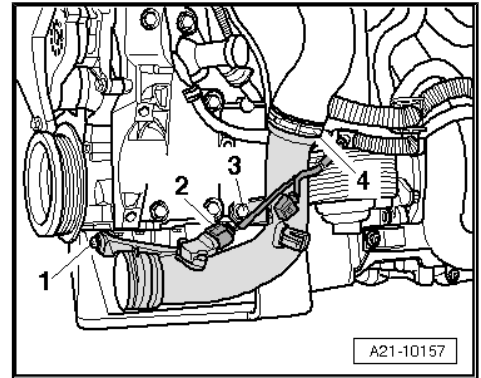
- Disconnect plug -2- from charge pressure sender - G31- / intake air temperature sender - G42- .
- Remove screws -1- and -3-.
- Detach charge air pipe from the charge air hose -4- and remove downwards.



Caution

Shut off the openings of the charge air cooler, e.g. with a clean piece of foam, so that no coolant can get in.

- Remove radiator ➤ [page 99](#) .
- Detach fuel feed line -2- and fuel return-flow line -1-, to do so press in securing ring.



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- Detach coolant hose, fuel intake hose -2- and fuel return-flow hose -1- from pipes at cylinder head.



- Release screw -1- by one turn.
- Release screw -2- and nut -3-.
- Remove fuel filter with hoses connected.



Note

Mark the direction of rotation with chalk or a felt-tip pen before removing the V-ribbed belt. Reversing the rotation direction of an already used belt may destroy it.

- Remove V-ribbed belt ➔ [page 21](#) .
- Remove alternator ➔ Electrical System ➔ Rep. gr. 27 .



WARNING

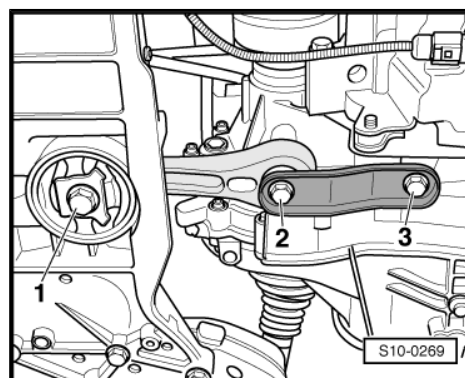
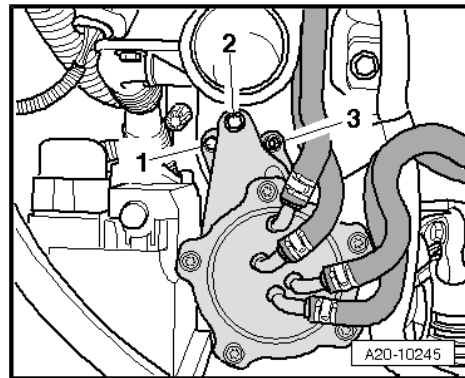
Do not open the refrigerant circuit of the air conditioning system.



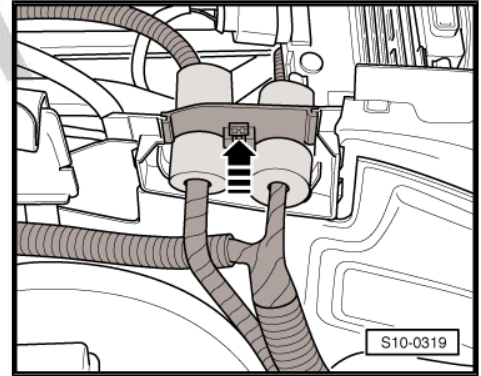
Note

In order to avoid damage to the AC compressor as well as to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.

- Remove AC compressor from the bracket for auxiliary units ➔ [page 21](#) .
- Attach AC compressor to the lock carrier with connected coolant hoses.
- Remove bracket for the wiring harness of the oil level and oil temperature sender - G266- from the assembly carrier.
- First unscrew screw -1- unscrew and then screws -2- and -3-.
- Remove pendulum support.
- Remove pre-exhaust pipe with diesel particle filter ➔ [page 154](#) .
- Unlatch the fuse and disconnect the front plug from the engine control unit ➔ [page 151](#) .



- Release duct for engine wiring harness -arrow- and pull out upwards.

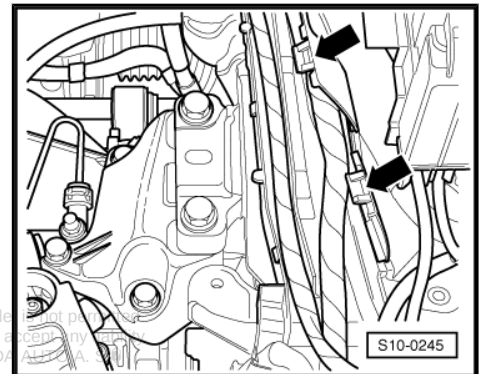


- Open the cable guides -arrows-, remove the engine wiring harness and place down to the side.
- Release all remaining plugs at engine and gearbox and lay aside the relevant lines.



Note

To release the plug for the engine speed sensor, push down on the plug with a screwdriver while simultaneously lifting the release button with a thin wire hook. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by ŠKODA AUTO A. S. ŠKODA AUTO A. S. does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by ŠKODA AUTO A. S.



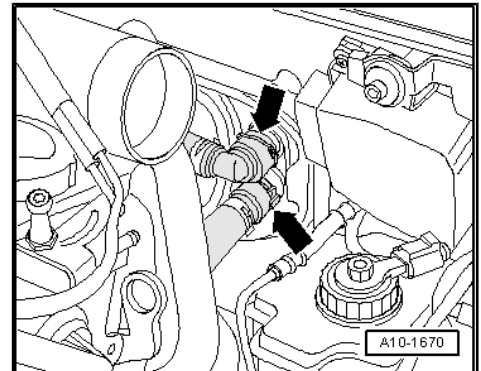
- Separate the quick couplings -arrows- at the heat exchanger.
- Detach the bottom coolant hose from the coolant expansion reservoir.

Vehicles with auxiliary heating

- Detach the coolant hoses of the auxiliary heating.
- Only remove long exhaust pipe of auxiliary heater ⇒ Heating, air conditioning ⇒ Rep. gr. 82 ,

Continued for all vehicles

- Detach all connecting and vacuum hoses from the engine.
- Remove shift mechanism from gearbox ⇒ gearbox ⇒ Rep. gr. 34 .
- Disconnect pipe hose line to the clutch control slave cylinder ⇒ Gearbox ⇒ Rep. gr. 30 ,



WARNING

After separating the hydraulic line, do not operate the clutch pedal.

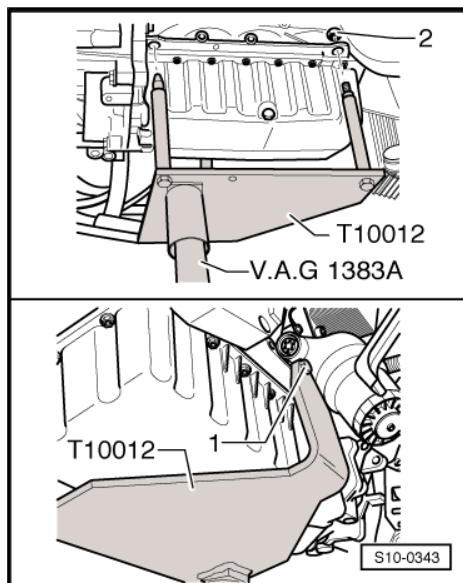


- Screw engine mount - T10012- to the cylinder block with nut -2- and screw -1- to 20 Nm.
- Insert engine/gearbox jack - V.A.G 1383 A- in the engine mount and slightly raise.

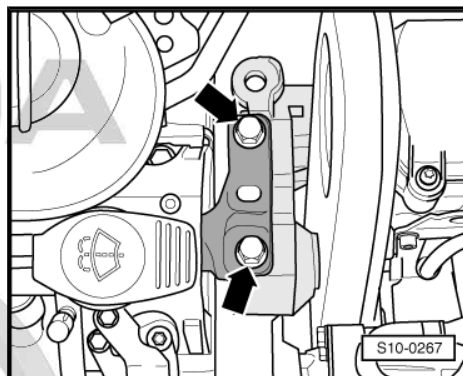


WARNING

Use double ladder to release the screws for the engine/gearbox mounting.



- Successively release screws for engine mounting -arrows-.



- Successively release screws for gearbox mounting -arrows-.

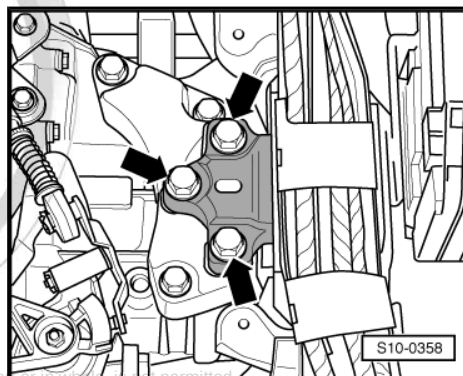


Note

- ♦ Check whether all hose and line connections between engine, gearbox and body are released.
- ♦ When lowering carefully guide the engine with the gearbox, in order to avoid damage.

- Carefully lower engine with gearbox.

- Remove the gearbox from the engine ⇒ gearbox ⇒ Rep. gr. 34 .



1.1.1 Removing and installing engine trim panel

Removing

- Remove dipstick -1- from dipstick guide.
- Remove outer -2- and inner -3- engine cover by pulling evenly upwards.
- Push the dipstick back into the dipstick guide.

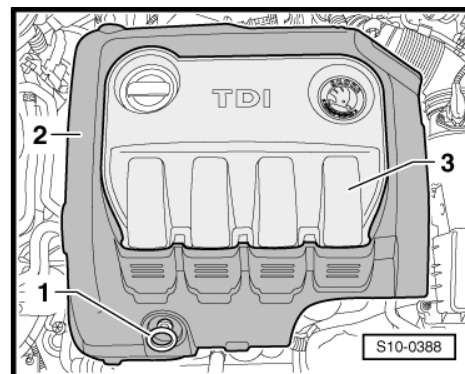
Installing

- Remove dipstick -1- from dipstick guide.

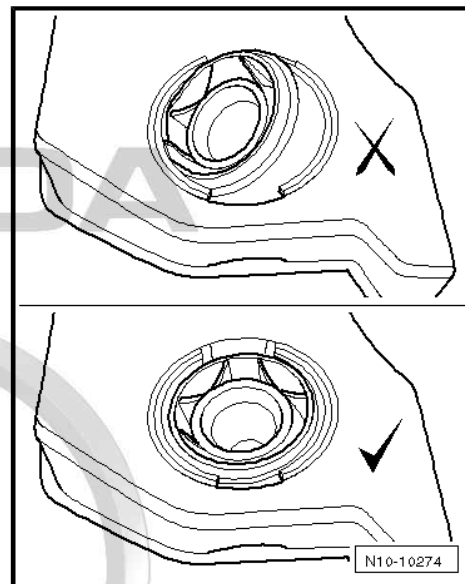


Caution

Before installing the engine cover, check the correct installation position of the 4 fastening elements (ball sockets). Put them back in the correct positions if necessary. Otherwise this can lead to damage to the engine cover.



- If necessary, press the ball sockets into the correct positions.
- Place the engine cover onto the fixing points and press it into the catches.
- Push the dipstick back into the dipstick guide.



1.2 Securing the engine to the assembly stand

Special tools and workshop equipment required

- ◆ Lifting device - MP 9-201 (2024A)-
- ◆ Engine mount - MP 1-202-
- ◆ Hook - MP 1-202/10-
- ◆ Bushing - T30010 (VW 540/1B)-
- ◆ Assembly stand - MP 9-101-
- ◆ Workshop crane , e.g. -VAS 6100-

Work procedure

- Separate engine from gearbox.



WARNING

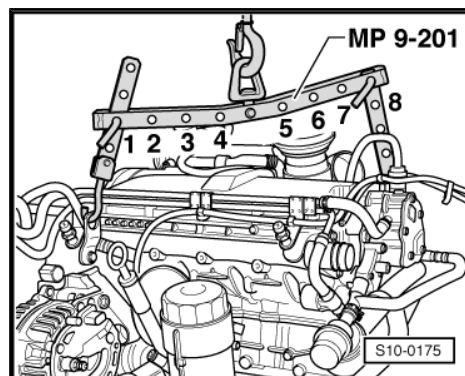
Use securing pins on the hooks and rig pins to prevent release.

- Attach lifting device - MP 9-201- at engine and at workshop crane , e.g. -VAS 6100- .

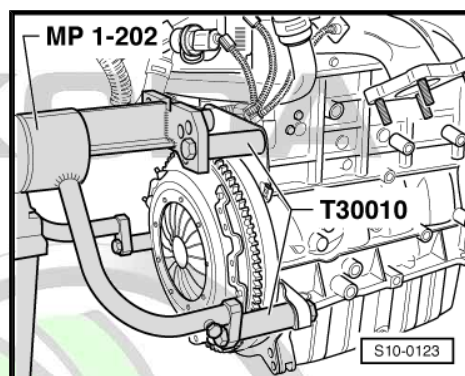
Belt pulley side: 2nd hole of the extension in Position 1.

Flywheel side: 2nd hole of the extension in Position 8.

- Lift engine with assembled engine mount - T10012- out of the engine/gearbox jack using the workshop crane .
- Remove engine mount - T10012 - .



- To carry out assembly work, use the engine bracket - MP 1-202- , adapter - MP 1-202/10- and bushing - T30010- to secure the engine to the assembly stand - MP 9-101- ; (the illustration shows the 1.9 l/47 kW SDI engine; attachment is identical).



1.3 Installing engine

Installation occurs in reverse order to removal. Pay attention to the following:



Note

- ◆ *When performing installation work replace the self-locking nuts.*
- ◆ *Replace screws which have been tightened to a torquing angle as well as sealing rings and seals.*
- ◆ *Fit all cable straps on again in the same place when installing.*
- ◆ *Secure all hose connections with corresponding hose clips.*



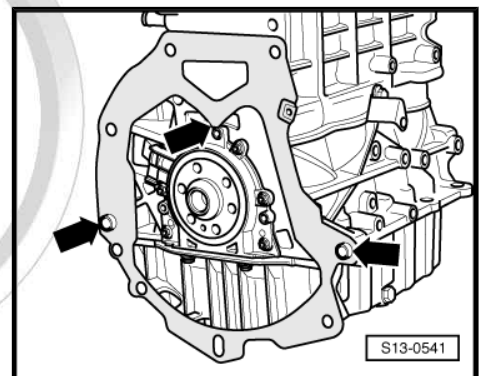
Caution

When undertaking all installation work, particularly in the engine compartment because of its cramped construction, please observe the following:

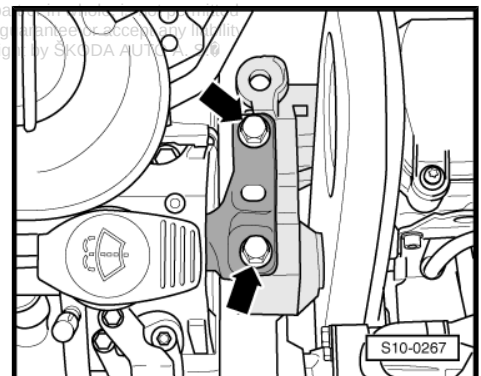
- ◆ *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- ◆ *To avoid damage to lines/wiring, ensure sufficient clearance to all moving or hot components.*

Observe all safety measures and notes for assembly work on the fuel supply and injection system, at the charge air system and observe as well the rules for cleanliness ➔ [page 2](#) .

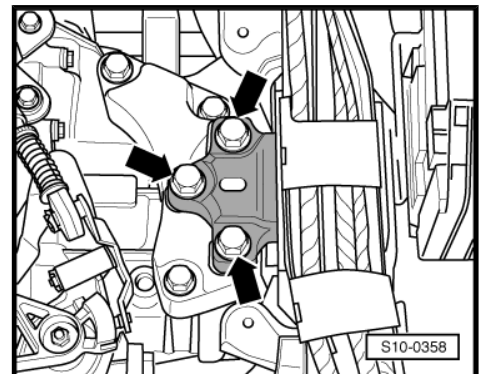
- Clean the serration of the drive shaft and if the clutch disc has been used clean the hub serration, remove corrosion and only apply a very thin layer of grease - G 000 100- to the serration of the drive shaft. Subsequently move the clutch disc up and down on the drive shaft until the hub fits smoothly on the shaft. Always remove excess grease.
- After installing the coupling, check the centering of the clutch disc ➔ gearbox ➔ Rep. gr. 30 .
- Check the clutch release bearing for wear. Replace release bearing if worn ➔ gearbox ➔ Rep. gr. 30 .
- Check whether the dowel sleeves for centring the engine/gearbox are present in the cylinder block; insert if necessary.
- Ensure that the intermediate plate has been inserted on the sealing flange and is pushed onto the dowel sleeves -arrows-.
- Screw on gearbox to engine ➔ gearbox ➔ Rep. gr. 34 .
- Insert engine with gearbox into the body.



- Successively screw in screws for engine mounting -arrows- by hand.



- Successively screw in screws for gearbox mount -arrows- by hand.
- Adjust assembly bracket ➔ [page 18](#) and tighten screws ➔ [page 17](#) .
- Remove engine mount - T10012- from engine.

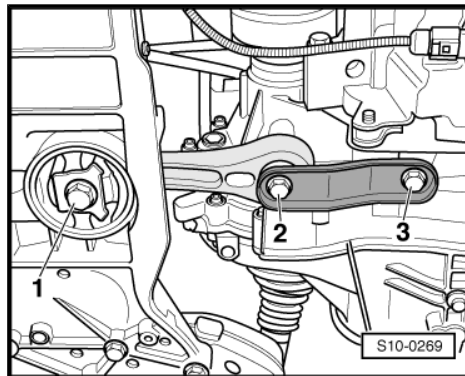




- Screw on pendulum support with new screws -2- and -3- at gearbox and then tighten with new screw -1- at assembly carrier.

Tightening torque: ➔ [page 17](#)

- Attach the right drive shaft and screw the left drive shaft onto the drive flange ➔ Chassis ➔ Rep. gr. 40 .
- Install pre-exhaust pipe with diesel particle filter ➔ [page 154](#) .
- Install the tube-hose line to the slave cylinder and bleed the clutch control ➔ Gearbox ➔ Rep. gr. 30 .
- Attach the shift mechanism to the gearbox and adjust ➔ Gearbox ➔ Rep. gr. 34 .
- Install radiator ➔ [page 99](#) .



Vehicles with auxiliary heating

- Attach coolant hoses to the auxiliary heating.
- Fit long exhaust pipe of auxiliary heater ➔ Heating, air conditioning ➔ Rep. gr. 82 ,

Continued for all vehicles

- Install AC compressor ➔ [page 21](#) .
- Install alternator ➔ Electrical System ➔ Rep. gr. 27 .
- Install the V-ribbed belt ➔ [page 21](#) .
- Connect all connecting, fuel, cooling fluid, vacuum and suction hoses to the engine.
- Observe the assembly instruction for hose connections with push-fit couplings ➔ [page 130](#) .
- Connect electrical connections and attach cables ➔ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install battery ➔ Electrical System ➔ Rep. gr. 27 .
- Install bulkhead plenum chamber and plenum chamber cover ➔ Body Work ➔ Rep. gr. 66 .
- Install wiper arms ➔ Electrical System ➔ Rep. gr. 92 .
- Top up coolant ➔ [page 96](#) .
- Checking the oil level ➔ Maintenance ; Booklet Octavia II.
- Install the noise insulation ➔ Body Work ➔ Rep. gr. 50 .
- Install bottom part of right wheelhouse liner ➔ Body Work ➔ Rep. gr. 66 .
- Perform a test drive.
- Query all fault memories, rectify any faults and delete fault memories ➔ Vehicle diagnostic tester.



Note

After deleting the event memory of the engine control unit the readiness code must be re-generated.

Specified torques

Component		Nm
Screws or nuts	M6	9
	M7	13
	M8	20
	M10	40
	M12	70
Engine/gearbox connecting screws ⇒ gearbox ⇒ Rep. gr. 34		

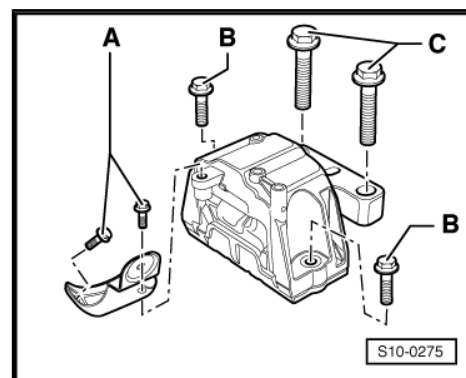
1.4 Tightening torques of the unit mounting

Unit mounting for engine

A - 20 Nm + torque a further 90° (1/4 turn) - replace

B- 40 Nm + torque a further 90° (1/4 turn) - replace

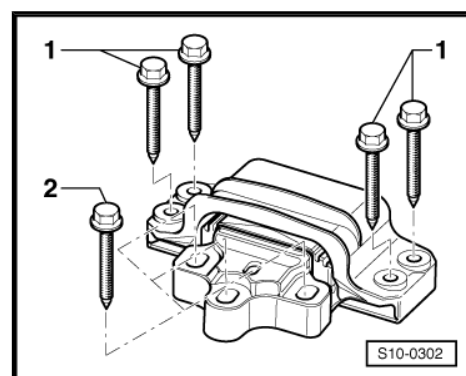
C- 60 Nm + torque a further 90° (1/4 turn) - replace



Unit mounting for gearbox

1 - 40 Nm + torque a further 90° (1/4 turn) - replace

2 - 60 Nm + torque a further 90° (1/4 turn) - replace



Pendulum support

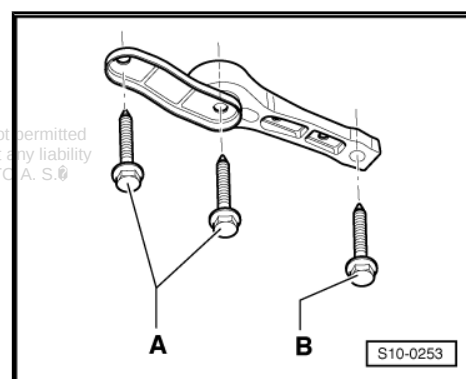
A (strength category 8.8) - 40 Nm + torque a further 90° (1/4 turn) - replace

A (strength category 10.9¹⁾) - 50 Nm + torque a further 90° (1/4 turn) - replace

B- 100 Nm + torque a further 90° (1/4 turn) - replace

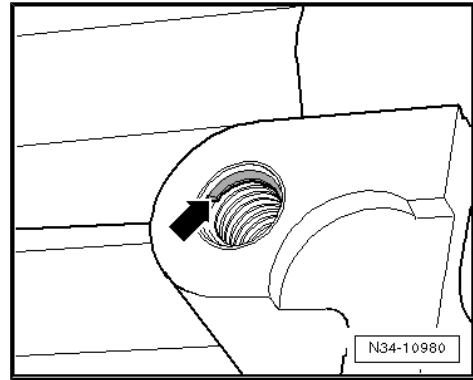
Remove: First remove screw -B-, then screws -A-.

Install: First tighten screws -A-, then screw -B-.





¹⁾On manual gearbox MQ350 (02Q), only use the screws with the strength category 10.9 if threaded inserts (e.g. Heli Coil) -arrow- have been installed.



1.5 Checking and adjusting the assembly bracket

1.5.1 Checking the assembly bracket

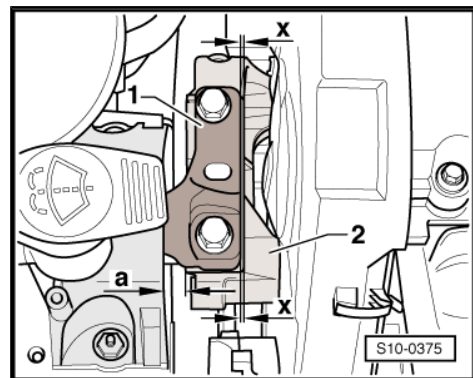
Check dimensions on the right hanger for engine/gearbox unit:

- Between engine bracket and engine support there must be a distance -a- of 10 ... 13 mm.
- The cast iron edge on the engine support -2- must be parallel to the supporting arm -1- the dimension -x- must be the same at the front and rear.



Note

The distance -a- can be checked, for example with suitable round bars.



Only if there is an acoustic complaint (engine or gearbox knock on the frame side rail when cornering) and the dimension -a- is outside 10 ... 13 mm:

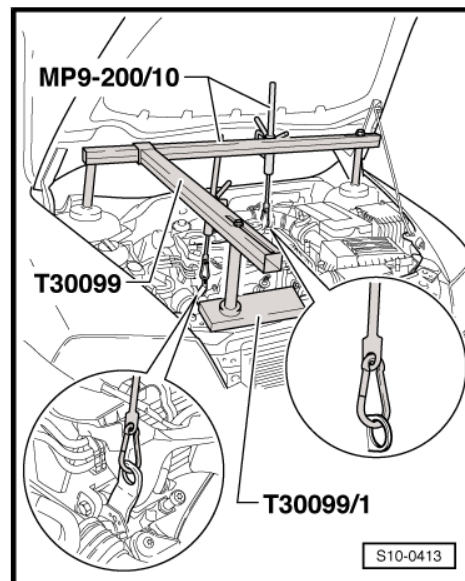
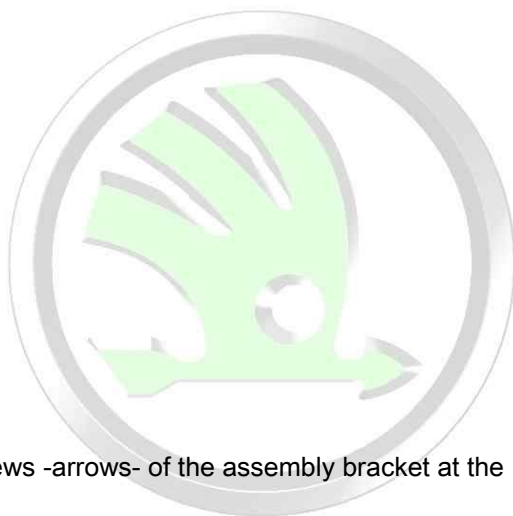
- Adjust the assembly bracket ⇒ [page 18](#) .

1.5.2 Adjusting the unit mounting

Special tools and workshop equipment required

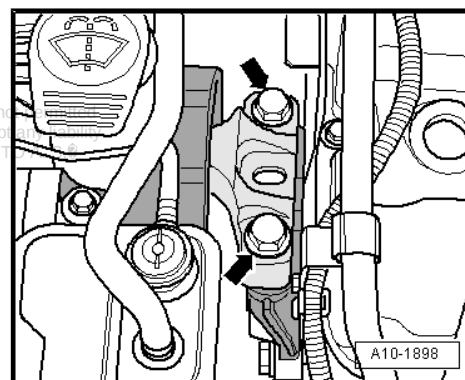
- ◆ Supporting device - T30099-
- ◆ Washer - T30099/1-
- ◆ Hook - MP 9-200/10 (10-222A/10)-
- Remove battery and battery tray ⇒ Electrical System ⇒ Rep. gr. 27 .
- Remove the cooling water tank cover ⇒ Body Work ⇒ Rep. gr. 66 .

- Position supporting device - T30099- and base - T30099/1- and support the engine/gearbox unit in its installed position.
- Uniformly pre-tension the engine/gearbox unit with both spindles, but do not raise.

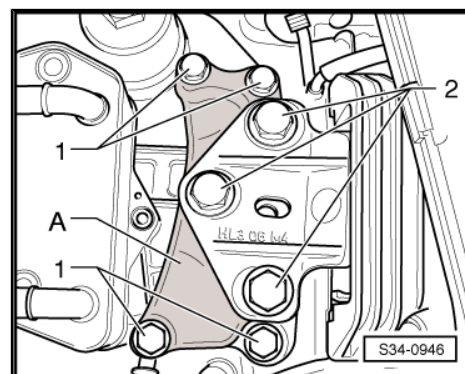


- Release the screws -arrows- of the assembly bracket at the engine.

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- Slightly loosen the screws -2- of the unit mounting at the gear-box (less than 1 revolution).
- Successively replace all the screws of the assembly bracket (as long as it has not already been performed when installing the engine) and insert these loosely.





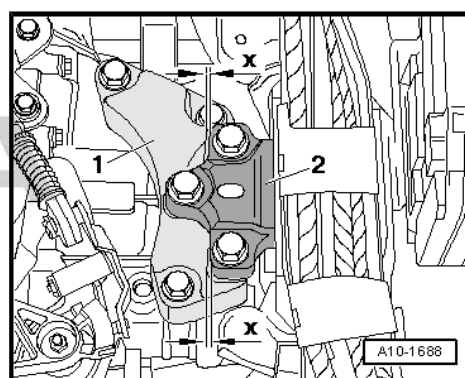
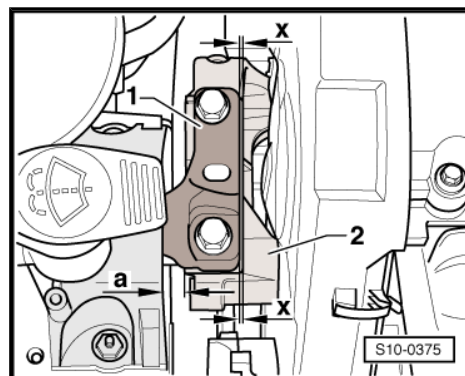
- Move the engine/gearbox assembly with an assembly lever between engine support -1- and supporting arm -3- for engine mount until the following dimensions are set:
- Between engine bracket and engine support there must be a distance -a- of 10 mm.
- The cast iron edge on the engine support -2- must be parallel to the supporting arm -1- the dimension -x- must be the same at the front and rear.



Note

The distance -a- = 10 mm can be checked e.g. with suitable round bars.

- Tighten screws for engine assembly bracket ➔ [page 17](#) .
 - Make sure that on the gearbox side the edges of the supporting arm -2- and gearbox support -1- are parallel.
 - The dimension -x- must be the same on both mount sides.
 - Tighten screws for gearbox assembly mounting ➔ [page 17](#) .
- Further installation occurs in reverse order.



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13 – Crankshaft group

1 Disassembling and assembling engine

1.1 Removing and installing V-ribbed belt

1 - 90 Nm + torque a further 90°
(1/4 turn)

- ☐ replace
- ☐ Attach ⇒ [page 22](#)

2 - Guide pulley

- ☐ for toothed belt

3 - Bracket for auxiliary units

- ☐ Tightening sequence
⇒ [page 22](#)

4 - Bushing

5 - 23 Nm

6 - AC generator

- ☐ removing and installing
⇒ Electrical System ⇒
Rep. gr. 27
- ☐ to facilitate positioning,
push the threaded bushings of the fixing screws
on the generator backwards slightly

7 - 45 Nm

- ☐ Observe tightening sequence
⇒ [page 22](#)

8 - Bushing

- ☐ 2 pieces
- ☐ must be inserted in the
holder (Pos. 3)

9 - 25 Nm

10 - AC compressor

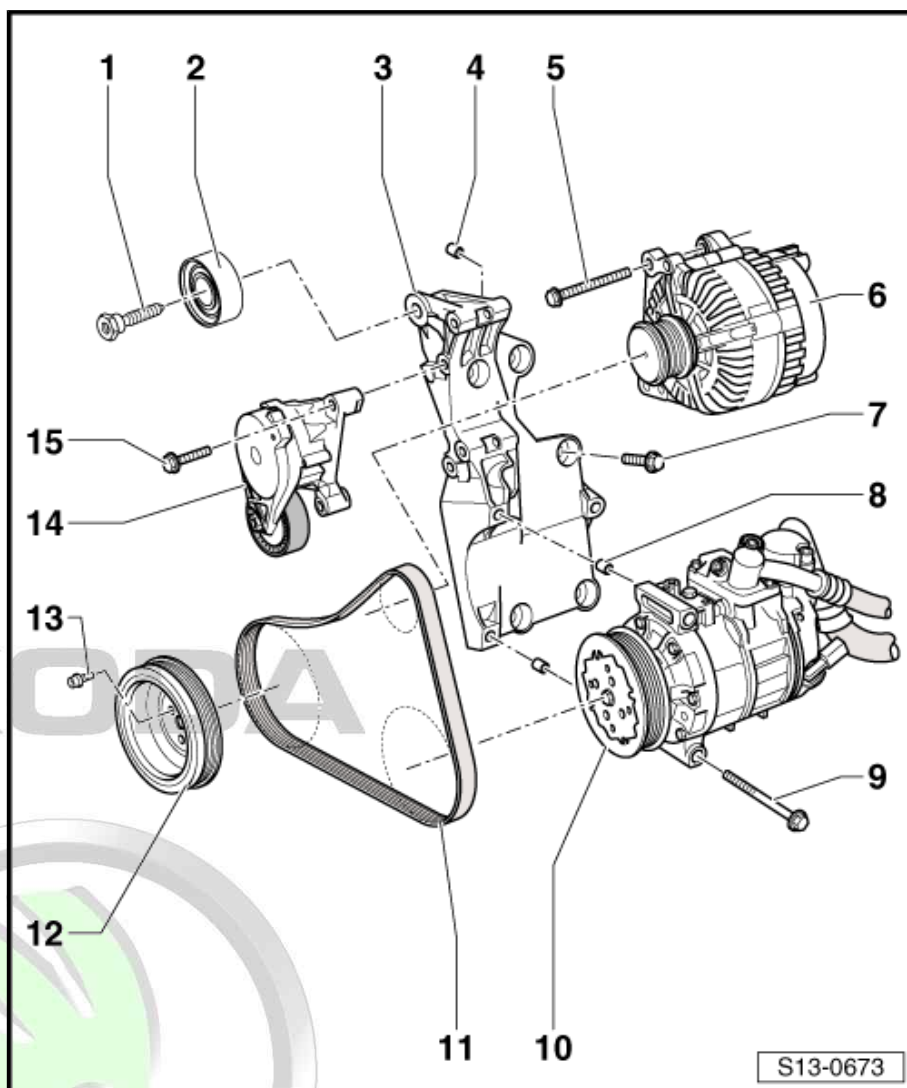
- ☐ removing and installing
⇒ Heating, Air Conditioning
⇒ Rep. gr. 87

11 - V-ribbed belt

- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ check for wear
- ☐ do not kink
- ☐ Removing ⇒ [page 22](#)
- ☐ installing ⇒ [page 22](#)

12 - Belt pulley

- ☐ with vibration damper
- ☐ can be installed only in one position



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13 - 10 Nm + torque a further 90° (1/4 turn)

- ☐ replace

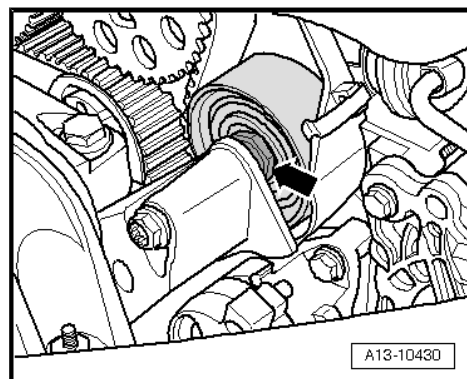
14 - Tensioning device for V-ribbed belt

- ☐ swivel tensioning device for V-ribbed belt with open-end wrench to slacken the V-ribbed belt
- ☐ after removal from fuel filter, can be locked with connecting pin - T10060A- or Allen key

15 - 23 Nm

Mounting - toothed belt guide pulley

Screw -arrow- with inside thread for fixing the engine support.



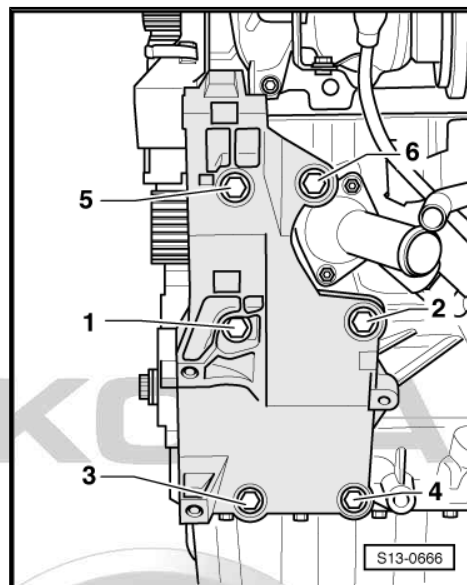
Bolts at bracket for auxiliary units - tightening sequence

Removing



Caution

Mark the direction of rotation with chalk or a felt-tip pen before removing the V-ribbed belt. Reversing the rotation direction of an already used belt may destroy it.



- Swing the tensioning device in -the direction of the arrow- de-tension the V-ribbed belt.
- Hold the tensioning device and remove the de-tensioned V-ribbed belt.

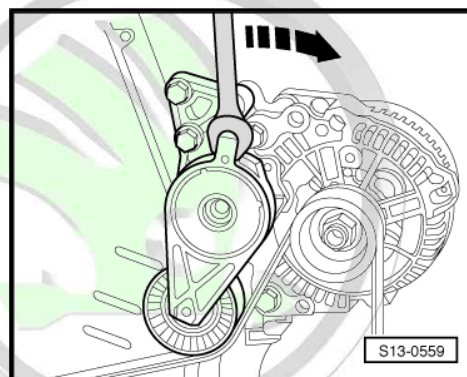
Installing

Installation occurs in reverse order to removal. Pay attention to the following:

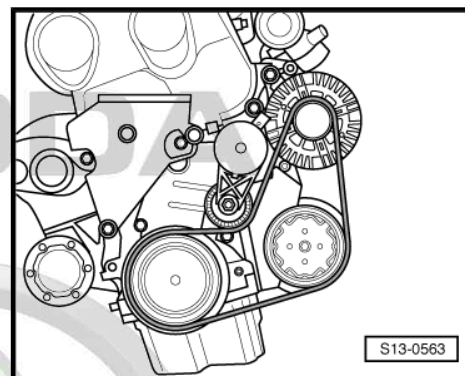


Note

Before fitting the V-ribbed belt make sure that all assemblies (generator and AC compressor) are securely mounted.



- First position the ribbed V-belt on the belt pulleys of the crankshaft and AC compressor and on the belt pulley of the generator last; then release the tensioning device.
- Check correct positioning of the ribbed V-belt on the belt pulleys.
- Start engine and check ribbed V-belt run.



1.2 Removing and installing toothed belt

1.2.1 Summary of components - part 1

1 - 10 Nm + torque a further 90° (1/4 turn)

- ☐ replace

2 - Belt pulley - crankshaft

- ☐ with vibration damper
- ☐ can be installed only in one position

3 - 10 Nm

- ☐ insert using locking agent -D 000 600 A2-

4 - 40 Nm + torque a further 180° (1/2 turn)

- ☐ replace
- ☐ Observe tightening torque and tightening sequence ➔ [page 24](#)

5 - Engine support bracket

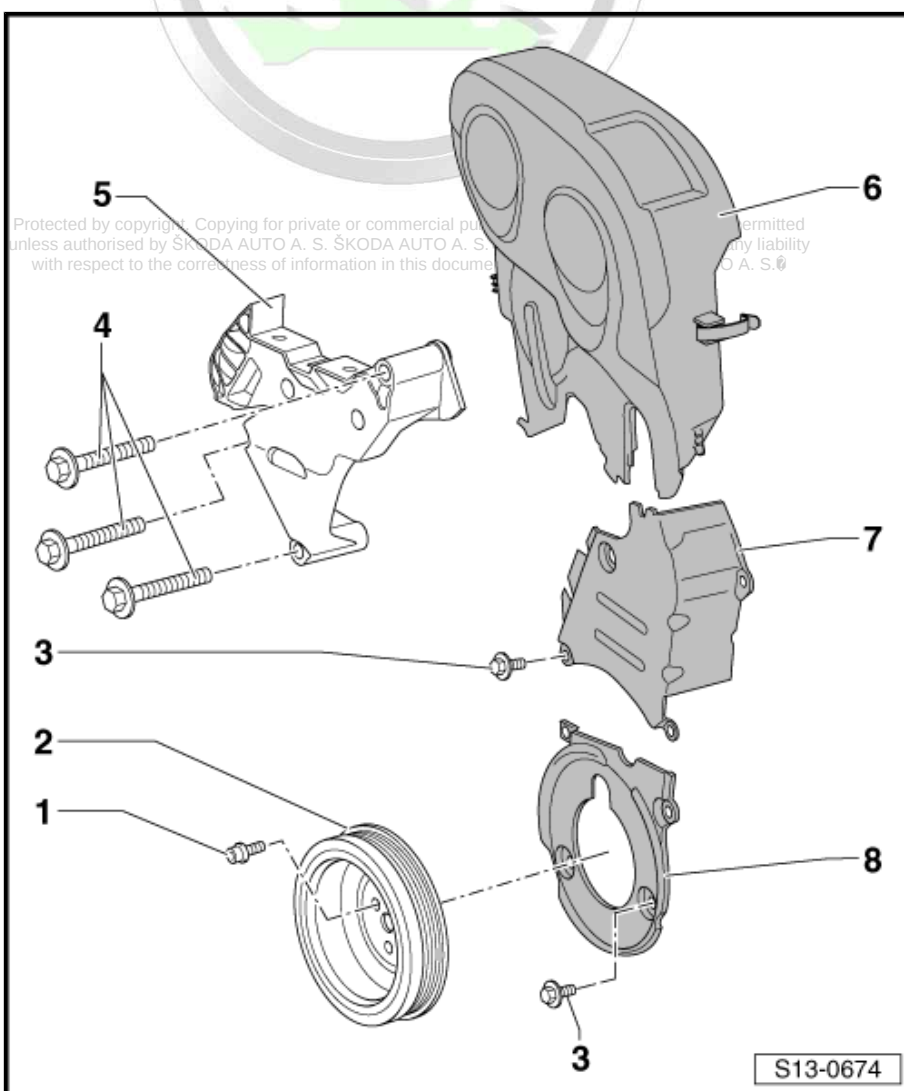
6 - Top toothed belt guard

- ☐ when installing in toothed belt guard, carefully insert middle part

7 - Middle toothed belt guard

- ☐ to remove, remove top toothed belt guard and unscrew tensioning device for ribbed V-belt.

8 - Bottom toothed belt guard





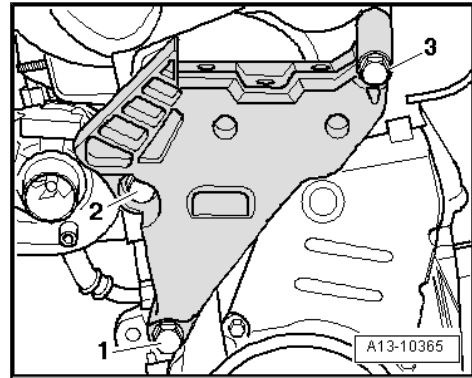
Tightening torque and sequence for engine support



Caution

The tightening sequence and the tightening torque of the fixing screws for the engine support must definitely be respected. Otherwise stress of the engine support bracket occurs, which results in the breaking of the engine support bracket.

- Screw in screws -1...3- by hand first.
- Then tighten screws -1 ... 3- to 40 Nm.
- Then torque screws -1...3- a further 180° (1/2 turn).



Note

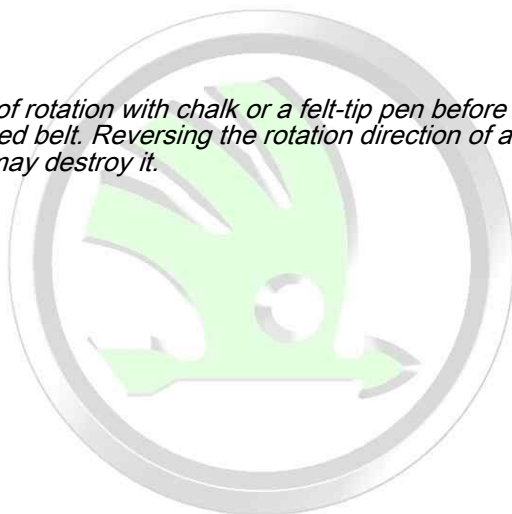
- ◆ *To do so, lift or lower the engine with the supporting device - T30099- .*
- ◆ *Before the engine mount is installed, all the screws of the engine support must be tightened to the specified tightening torque.*

1.2.2 Summary of components - part 2



Note

Mark the direction of rotation with chalk or a felt-tip pen before removing the toothed belt. Reversing the rotation direction of an already used belt may destroy it.



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1 - 120 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ do not oil
- ☐ to release and tighten use counterholder - T30004- or counterholder - MP 1-310 (3099)-

2 - 20 Nm

- ☐ self-locking, replace

3 - Small guide pulley

4 - 20 Nm + torque a further 45° (1/8 turn)

5 - Tensioning pulley

6 - Toothed belt

- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ check for wear
- ☐ do not kink
- ☐ Removing ➔ [page 26](#)
- ☐ install (set the timing) ➔ [page 29](#)

7 - 25 Nm

8 - Toothed belt pulley, exhaust camshaft

- ☐ Check fitting position

9 - 25 Nm

10 - Toothed belt pulley, inlet camshaft

- ☐ Check fitting position

11 - 100 Nm

- ☐ to release and tighten use counterholder - T10051-

12 - 100 Nm

- ☐ to release and tighten use counterholder - T10051- ➔ [page 71](#)

13 - Hub

- ☐ For exhaust camshaft.

- ☐ to remove use extractor - T10052-

14 - Hub

- ☐ for intake camshaft with rotor for Hall sender - G40-
- ☐ to remove use extractor - T10052- ➔ [page 71](#)

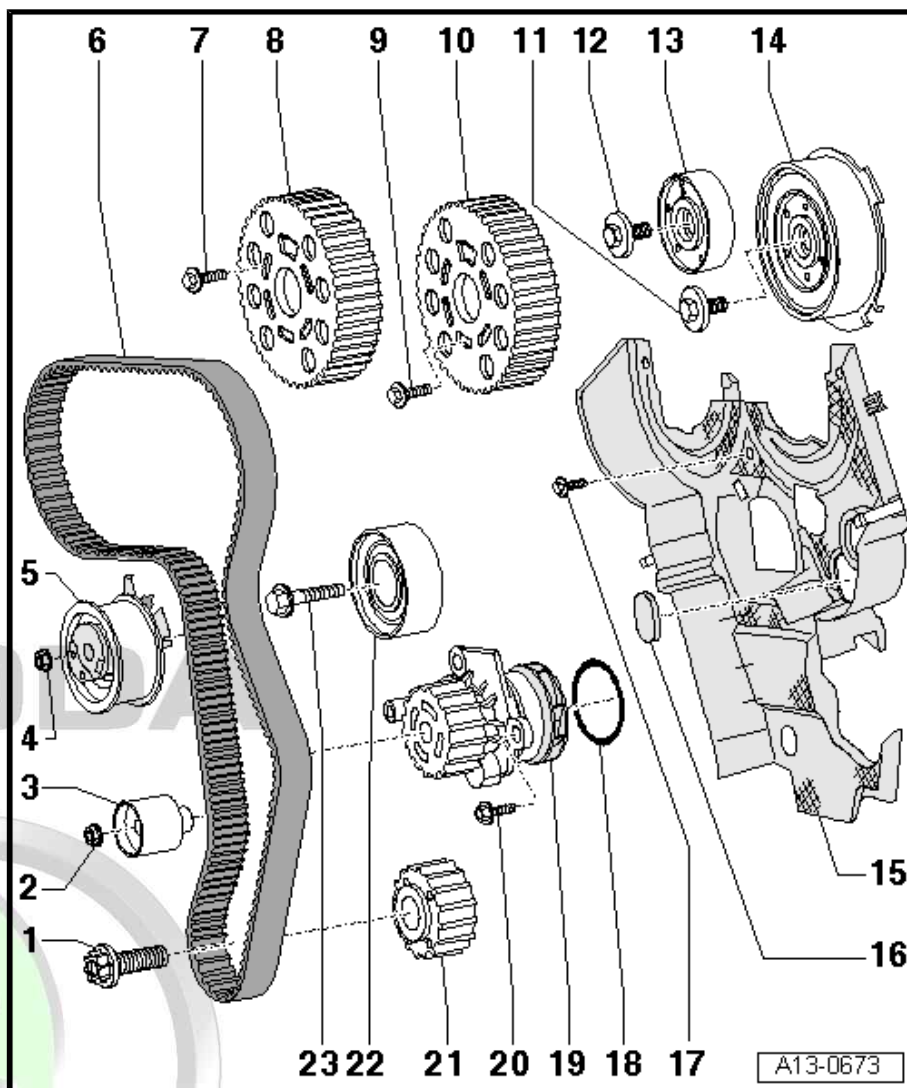
15 - Rear toothed belt guard

16 - Rubber bowl

- ☐ to remove the Hall sender - G40- (rear toothed belt guard does not have to be removed)
- ☐ Replace if damaged.

17 - 10 Nm

- ☐ insert using locking agent - D 000 600 A2-



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18 - O-ring

- ☐ replace

19 - Coolant pump

- ☐ Removing and installing ⇒ [page 100](#)

20 - 15 Nm

21 - Crankshaft toothed belt sprocket

- ☐ there must not be any oil present on the contact surface between the pulley and the crankshaft
- ☐ can be installed only in one position

22 - Large guide pulley

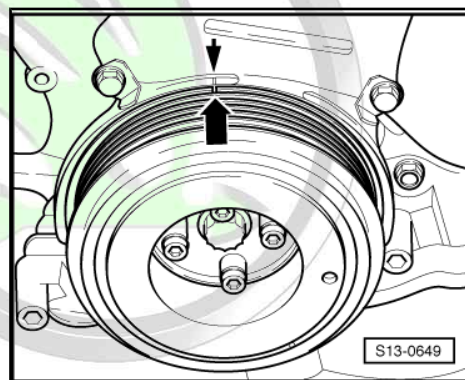
23 - 90 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ Attach ⇒ [page 22](#)

Adjust TDC for cylinder 1 with vibration damper installed

- Turn the crankshaft in the direction of engine rotation at the central screw so that the notch on the vibration damper (TDC marking for cylinder 1) -large arrow- is in line with the embossed arrow -small arrow- on the middle toothed belt guard as shown.

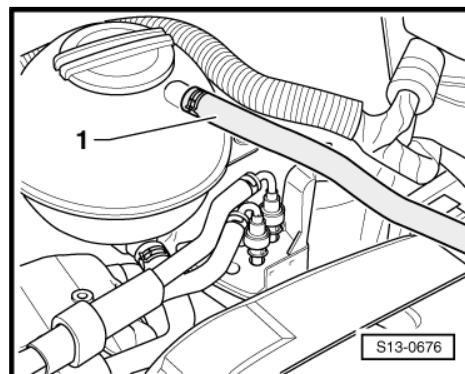
Use the mirror to do this.



1.2.3 Removing toothed belt

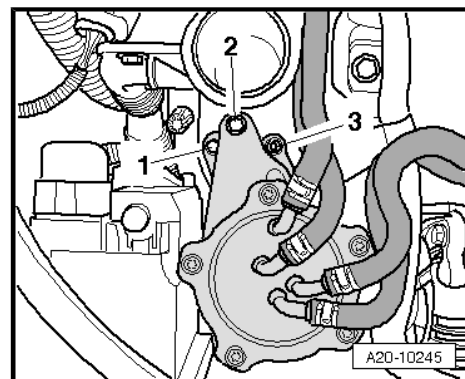
Special tools and workshop equipment required

- ◆ Rig pin for the injection pump - 3359- or -MP 1-301- (2x)
- ◆ Locking pin - T10060A-
- ◆ Crankshaft arrester - T10100-
- ◆ Pressure pad - T10172 - with stud - T10172/4-
- ◆ Offset screwdriver - T10264-
- ◆ Counterholder - T10265-
- ◆ Pliers for spring-type clips
- Remove engine cover ⇒ [page 13](#) .
- Detach coolant hose -1- from coolant expansion tank.

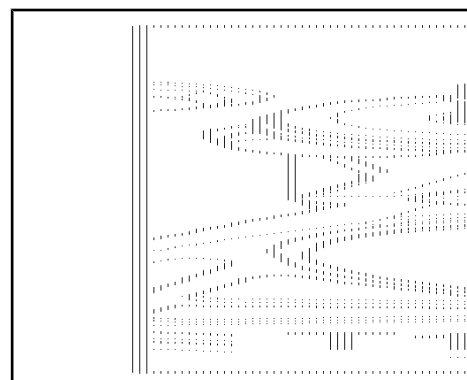


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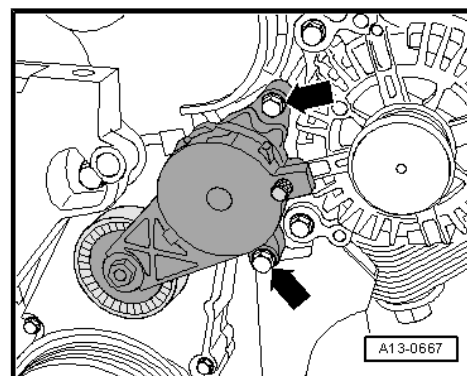
- Release screw -1- by one turn.
- Release screw -2- and nut -3-.
- Lay fuel filter to the side with the hoses connected.
- Remove V-ribbed belt ⇒ [page 21](#) .



- Lock the clamping device for V-ribbed belt with connecting pin or Allen key.
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Remove bottom part of right wheelhouse liner ⇒ Body Work ⇒ Rep. gr. 66 .



- Remove V-ribbed belt tensioning device -arrows-.



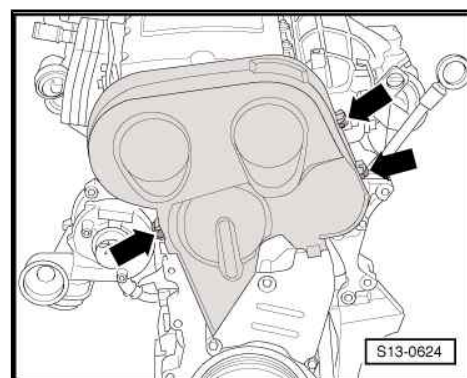
- Remove top toothed belt guard; to do so, release retaining clips -arrows-.



Caution

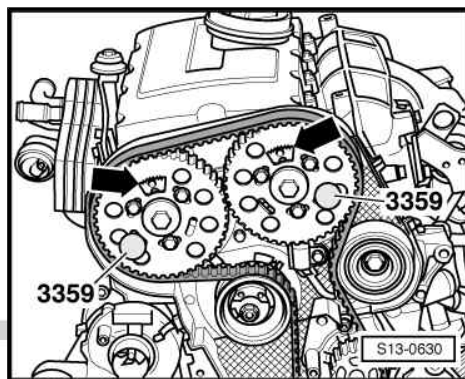
The engine may only be turned in the direction of engine rotation (clockwise) at the crankshaft.

- Rotate the crankshaft in direction of rotation of engine on TDC for cylinder 1.

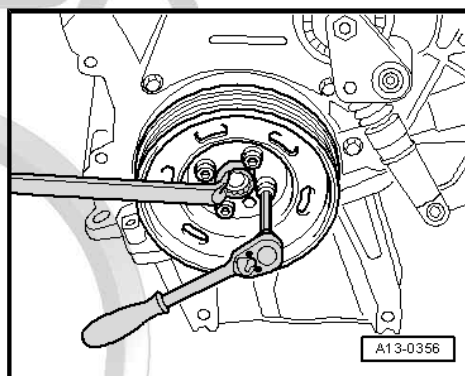




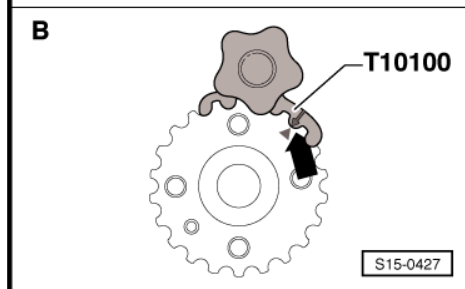
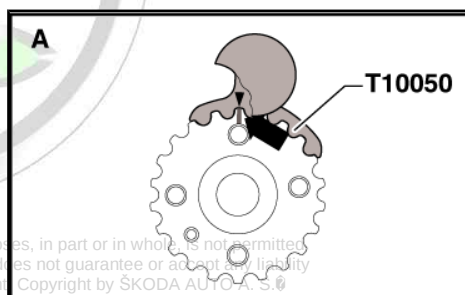
- The two tooth segments -arrows- on the toothed belt sprockets.
- Lock hubs using rig pins - 3359- .



- Remove crankshaft belt pulley. To do this, counterhold at the central screw with a ring spanner.
- Remove middle and bottom toothed belt guard.



- Lock the crankshaft toothed belt sprocket with the crankshaft arrester - T10100- (figure below "B").

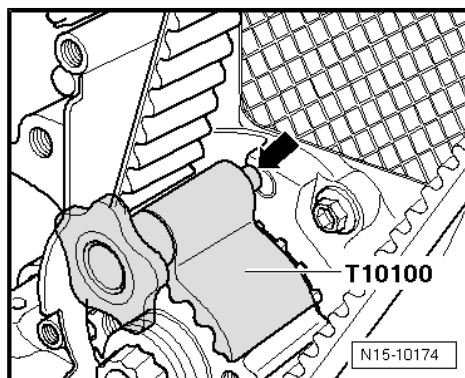


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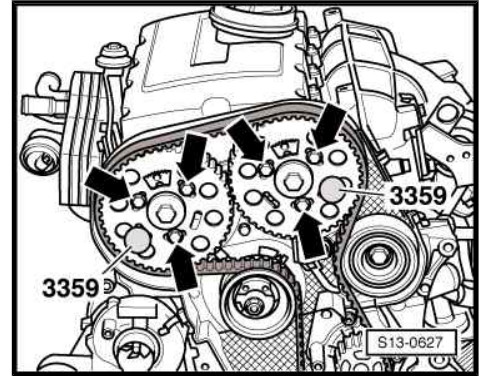


Note

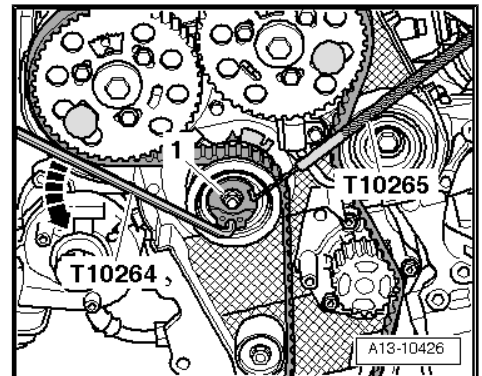
- ♦ *Markings on the toothed belt sprocket and on the crankshaft arrester must be in line with each other -arrow-.*
- ♦ *The pin on the crankshaft arrester -arrow- must engage into the hole in the sealing flange.*
- ♦ *The crankshaft arrester can only be fitted onto the toothed belt sprocket from the front side of the serration.*
- Mark the direction of rotation of the toothed belt with chalk or a felt-tip pen.



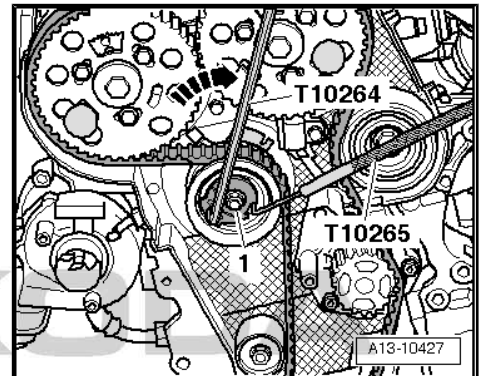
- Loosen screws for toothed belt sprockets -arrows- by approx. 1 turn.



- Loosen the fixing nut -1- of the tensioning pulley.
- Turn the eccentric of the tensioning pulley with the offset screwdriver - T10264- in anti-clockwise direction -arrow- until the tensioning pulley can be interlocked with the rig tool - T10265- .



- Now turn eccentric of the tensioning pulley clockwise -arrow- as far as the stop and tighten fixing nut -1- by hand.
- Firstly remove toothed belt from coolant pump toothed belt sprocket and then from the other toothed belt sprockets.



1.2.4 Installing (set the timing)



Caution

The following work sequence must be followed precisely.

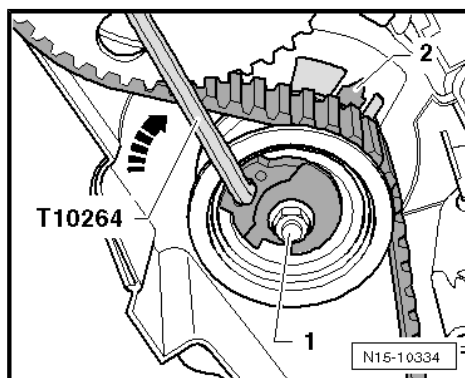
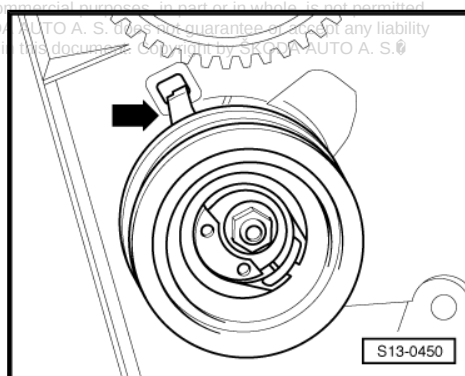
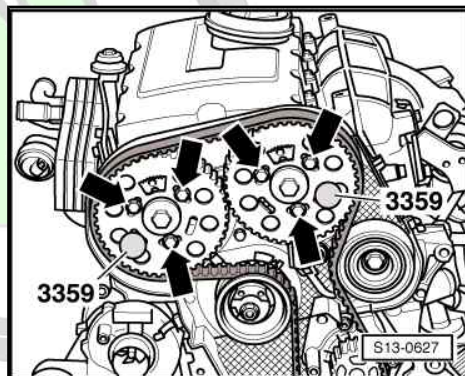
- ◆ *If a final test is omitted, for example, and the pins are not reinserted, there is a risk that the timing will not be set correctly and the vehicle will have poor driving performance and uneven idling.*

- Lock camshaft with securing pins - 3359- or -MP 1-301- .
- Lock the crankshaft with the crankshaft arrester - T10100- .
- Tensioning pulley is locked with rig pin - T10265- and fixed with fixing nut to the right stop.



Note

- ◆ *Only ever perform adjustment work on the toothed belt on a cold engine.*
- ◆ *When rotating the camshaft, the crankshaft must not be positioned at TDC for any piston. Risk of damaging valves and pistons.*
- Slightly screw in screws -arrows-.
- Camshaft sprockets must still turn on the hubs, but must not tilt.
- Turn camshaft sprockets clockwise in the elongated holes as far as the stop.
- Fit toothed belt onto crankshaft toothed belt sprocket, tensioning pulley, camshaft sprockets, large and small guide pulley and then finally the coolant pump toothed belt sprocket.
- Loosen the fastening nut of the tensioning pulley and remove the rig pin - T10265- from the tensioning pulley.
- Check the correct fitting of the tensioning pulley in the hole in the rear timing belt guard -arrow-.
- Turn the eccentric of the tensioning pulley with the offset screwdriver - T10264- clockwise -arrow- until the pointer -2- is in the centre of the base plate in front of the gap.



Note

- ◆ *Ensure that the fixing nut of the tensioning pulley does not turn.*
- ◆ *Use the mirror to do this.*
- Hold the eccentric of the tensioning pulley in this position and tighten the fixing nut to 20 Nm plus a further 45° (1/8 turn).



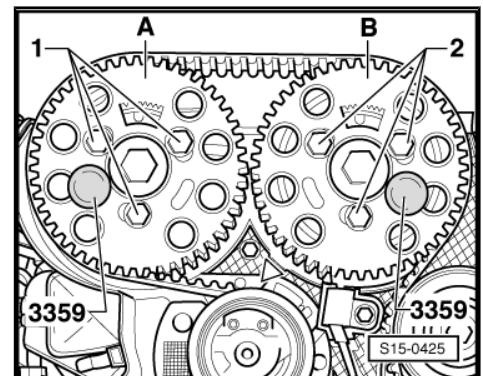
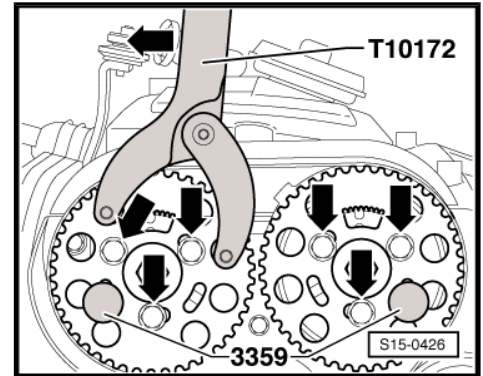
Note

When tightening the fixing nut, the pointer -2- turns max. 5 mm to the right from the gap on the base plate. This position must not be corrected, because the toothed belt settles when running-in.

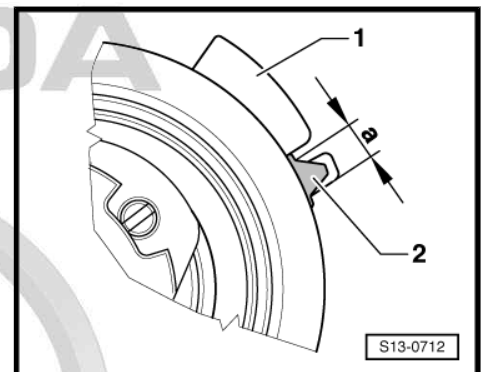
- Insert counterholder - T10172- with bolts - T10172/4- as shown and press in -direction of arrow-.
- Keep toothed belt sprockets pre-tensioned with counterholder - T10172- and tighten screws -arrows- of the two toothed belt sprockets to 25 Nm.
- Remove rig pins - 3359- and crankshaft arrester - T10100- .

Test timing:

- Turn crankshaft 2 turns in the direction of engine rotation until the crankshaft is positioned before TDC for cylinder 1 again.
- Lock hub -A- from the rotation direction with locking pin - 3359- .
- Check whether:

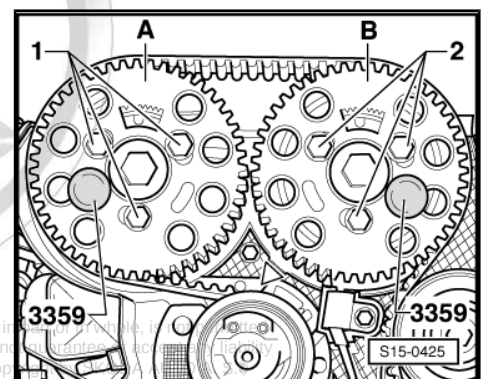


- ◆ The hub -B- can be locked with locking pin - 3359- ;
- ◆ The crankshaft can be locked with the crankshaft arrester - T10100- ;
- ◆ The pointer of the tensioning pulley -2- must be in area -a- of the base plate -1-.



If the hub -B- cannot be locked:

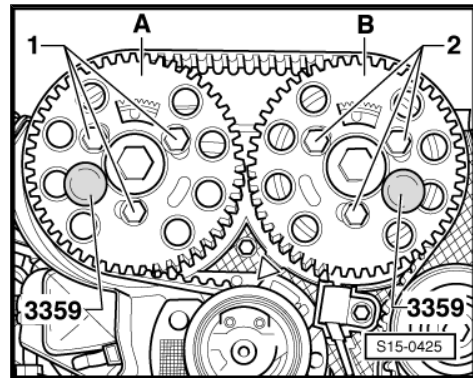
- Loosen the screws -2- for the intake camshaft toothed belt sprocket -B-.
- Place a ring spanner on the central screw for the intake camshaft.
- Turn the hub until the locking pin - 3359- can be inserted.
- Tighten screws -2- for the intake camshaft toothed belt sprocket -B- to 25 Nm.
- Remove rig pins - 3359- and crankshaft arrester - T10100- .
- Rotate the crankshaft 2 turns in the direction of running of the engine until the crankshaft is positioned again on TDC for cylinder 1.
- Repeat timing test ➤ [page 31](#) .





If the crankshaft cannot be arrested:

- Loosen the screws -1- and -2- for the toothed belt sprockets -A- and -B-.

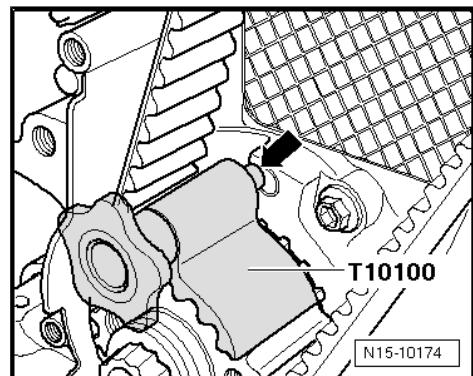


- Rotate the crankshaft in direction of rotation of engine until the crankshaft can be arrested with the crankshaft arrester - T10100- .

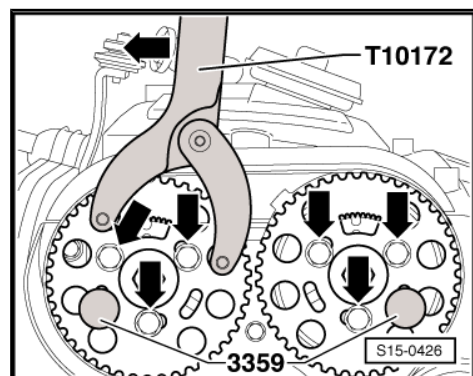


Note

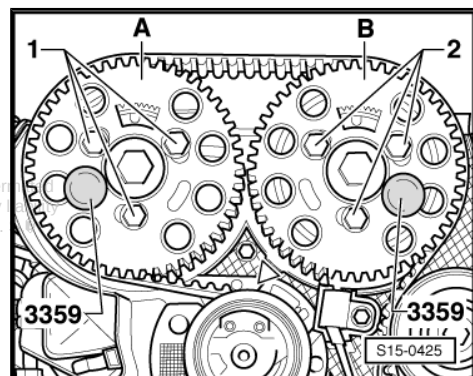
- ♦ The stud -arrow- must latch into the bore on the sealing flange.
- ♦ If the crankshaft has turned behind the TDC for cylinder 1, turn crankshaft back slightly and once again set to the TDC for cylinder 1 by turning in direction of rotation of engine.



- Insert counterholder - T10172- with bolts - T10172/4- as shown and press in -direction of arrow-.



- Keep toothed belt sprockets pre-tensioned using counterholder - T10172- and tighten screws -1- and -2- for toothed belt sprockets -A- and -B- to 25 Nm.
- Remove rig pins - 3359- and crankshaft arrester - T10100- .
- Rotate the crankshaft 2 turns in the direction of running of the engine until the crankshaft is positioned again on TDC for cylinder 1.
- Repeat timing test ➔ [page 31](#) .



Further installation

Further installation occurs in reverse order to removal.

2 Removing and installing sealing flange and flywheel



Note

Repairs to the clutch ⇒ gearbox ⇒ Rep. gr. 30.

1 - Sealing ring

- ☐ Replace ⇒ [page 34](#)
- ☐ do not oil or grease

2 - Sealing flange - belt pulley side

- ☐ must be positioned on dowel sleeves
- ☐ Removing and installing ⇒ [page 35](#)

3 - Cylinder block

4 - Dual-mass flywheel

- ☐ Removing and installing ⇒ [page 43](#)
- ☐ assembly is only possible in one position through offset holes

5 - 60 Nm + torque a further 90° (1/4 turn)

- ☐ replace

6 - Intermediate plate

- ☐ must be positioned on dowel sleeves
- ☐ do not damage/bend during assembly work
- ☐ hang on the sealing flange ⇒ [page 34](#)

7 - 15 Nm

- ☐ replace

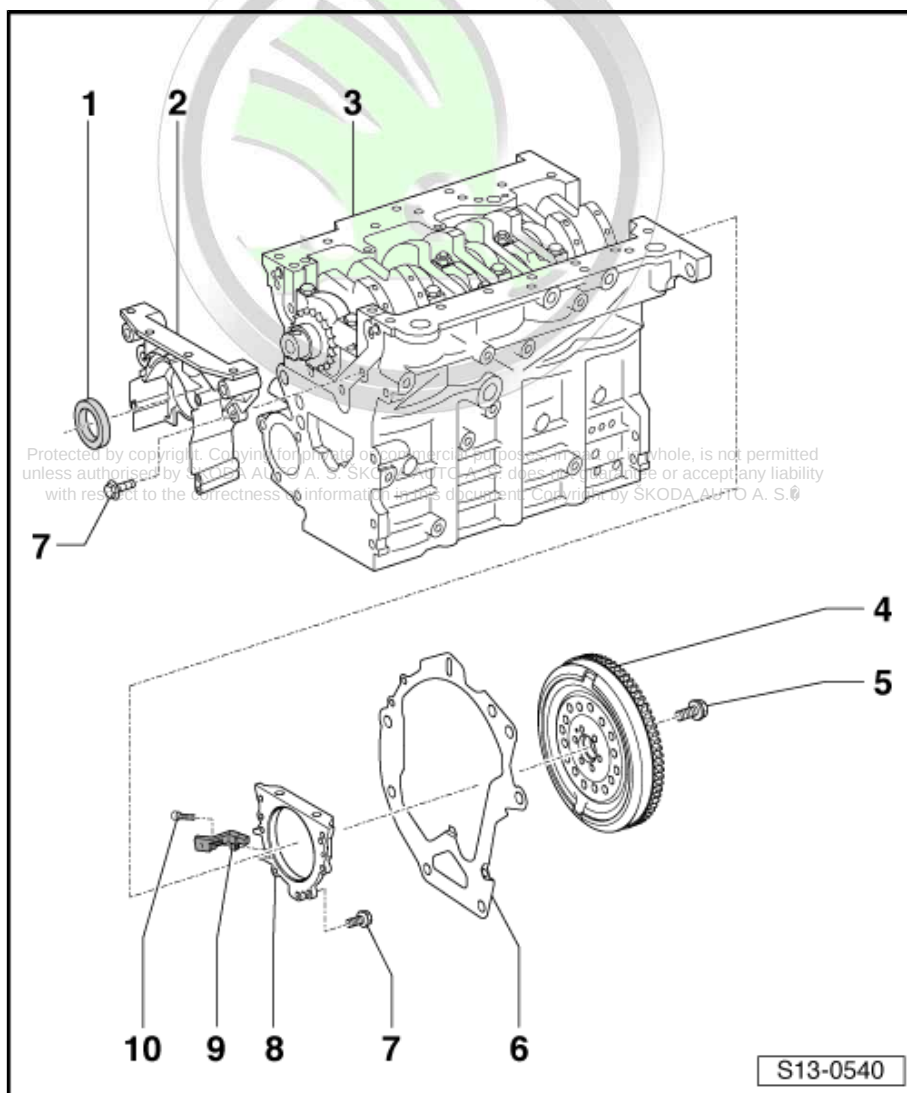
8 - Sealing flange on the gearbox side

- ☐ can only be replaced complete with gasket ring and with rotor of engine speed sender - G28-
- ☐ Replace ⇒ [page 37](#)

9 - engine speed sender - G28-

- ☐ Removing and installing ⇒ [page 149](#)

10 - 5 Nm

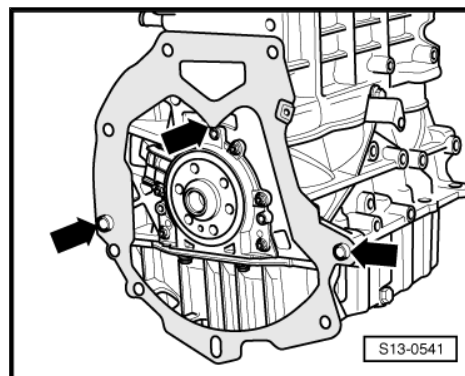


S13-0540



Installing intermediate plate

- Insert intermediate plate on sealing flange and push onto the dowel sleeves -arrows-.



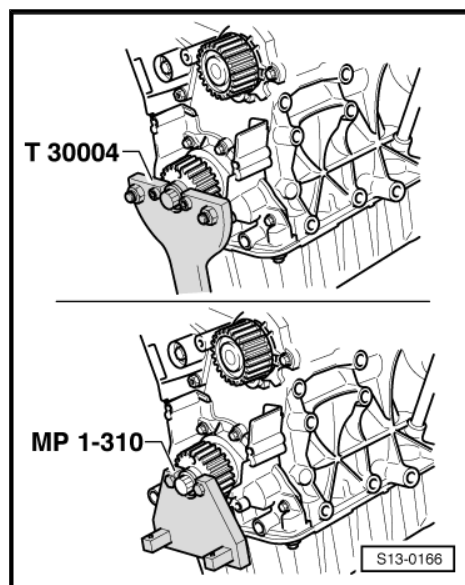
2.1 Replacing the sealing ring for the crankshaft (belt pulley side)

Special tools and workshop equipment required

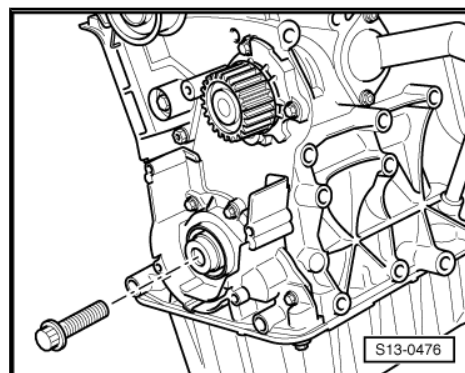
- ♦ Counterholder - T30004 (3415)- or counterholder for toothed belt sprocket - MP 1-310 (3099)-
- ♦ Sealing ring extractor - MP 1-226 (3203)-
- ♦ Assembly tool - T10053-

Removing

- Engine installed.
- Remove toothed belt ➔ [page 23](#) .
- Remove the crankshaft toothed belt sprocket; to do so, hold toothed belt sprocket with counterholder - T30004 - or lock with counterholder - MP 1-310- .



- To guide the gasket ring extractor screw the central screw for crankshaft - toothed belt sprocket in the crankshaft up to the stop.



- Turn inner part of gasket ring extractor - MP 1-226- two turns (approx. 3 mm) out of the outer part and lock with knurled screw.
- Oil the thread head of the sealing ring extractor, position and fix screw into the sealing ring as far as possible.
- Release knurled screw and turn the inner side against the crankshaft until the gasket ring is pulled out.
- Clamp gasket ring extractor into the vice and remove gasket ring with pliers.
- Clean the contact and sealing surfaces.

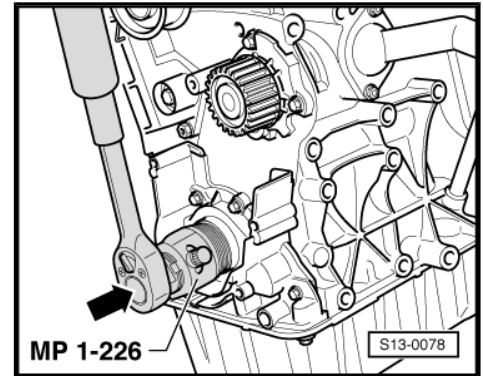
Installing



Note

Do not oil the sealing lip and the outer surface of the gasket ring before the pressing in procedure.

- Remove oil residue on the crankshaft journal with a clean cloth.
- Insert guide bushing - T10053/1- on the crankshaft bearing pin.
- Slide gasket ring over the guide bushing.

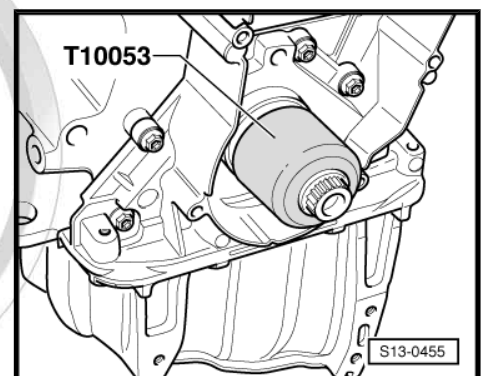
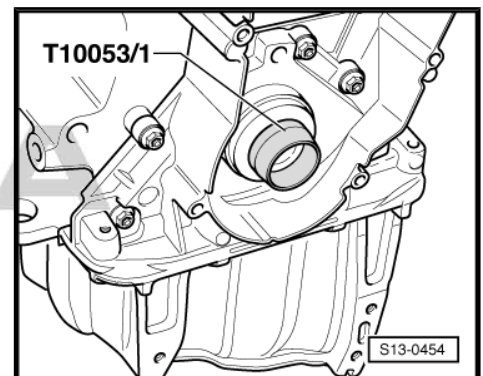


- Press in the gasket ring flush with the central screw for the toothed belt sprocket of the crankshaft and with the pressure bushing of the assembly device - T10053- .



Note

- ◆ *There must not be any oil present on the contact surface between toothed belt sprocket and crankshaft.*
- ◆ *Replace central screw for crankshaft toothed belt sprocket.*
- ◆ *Do not oil the central screw for crankshaft toothed belt sprocket.*



- Remove the crankshaft toothed belt sprocket; to do so, hold toothed belt sprocket with counterholder - T30004 - or lock with counterholder - MP 1-310 (3099)- .
- install (set the timing) ➔ [page 23](#) .

2.2 Removing and installing the sealing flange (belt pulley side)

Special tools and workshop equipment required

- ◆ Counterholder - T30004 (3415)- or counterholder for toothed belt sprocket - MP 1-310 (3099)-



- ◆ Assembly tool - T10053-
- ◆ Protective goggles and gloves
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-
- ◆ Silicone sealant - D 176 404 A2-

Removing

- Engine installed.
- Remove toothed belt ➔ [page 23](#) .
- Remove crankshaft - toothed belt sprocket, to this end lock toothed belt sprocket with counterholder - T30004- or counterholder - MP 1-310 - .
- Drain engine oil ➔ Maintenance ; Booklet Octavia II .
- Removing the oil pan ➔ [page 87](#) .
- Unscrew the fixing screws of the front sealing flange and remove sealing flange, if necessary release by applying slight blows with a rubber-headed hammer.
- Drive out the gasket ring from the removed sealing flange.

Installing

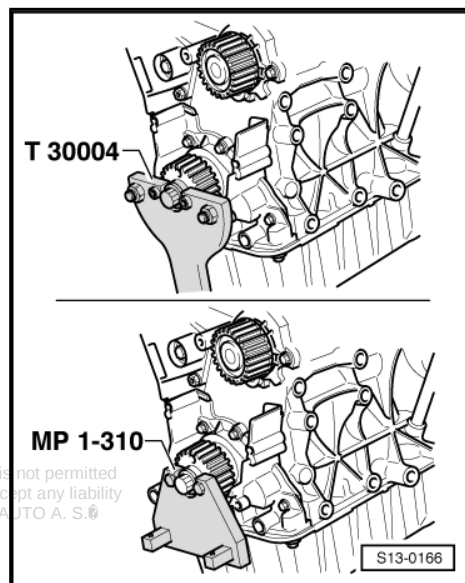
Installation occurs in reverse order to removal. Pay attention to the following:



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Wear protective gloves and goggles when working with gasket remover and degreasing agent!



- Remove residual sealant from the sealing surfaces on sealing flange, cylinder block and on the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.



Note

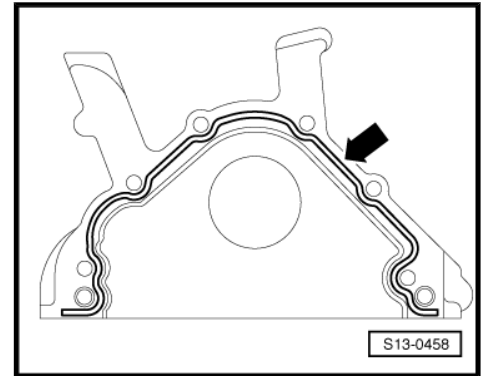
Pay attention to the use by date on the silicone sealant.

- Cut off nozzle tube at the front marking ($\varnothing$ of nozzle approx. 3 mm).

- Apply silicone sealant bead -arrow- to the clean sealing surface of the upper part of the sealing flange, as shown.
- Thickness of sealant bead -arrow-: 2...3 mm.

i Note

- ◆ *The sealant bead must not be thicker than 3 mm otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.*
- ◆ *The sealing flange must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *When installing the sealing flange with the gasket ring fitted place a guide sleeve - T10053/1- on the crankshaft journal.*



- Carefully push the sealing flange onto the dowel sleeves at the cylinder block and tighten new fixing bolts by hand.
- Tighten the screws of the sealing flange alternately and cross-wise to 15 Nm.
- Insert new sealing ring ⇒ [page 34](#) .
- Installing the oil pan ⇒ [page 87](#) .
- Remove the crankshaft toothed belt sprocket; to do so, hold toothed belt sprocket with counterholder - T30004 - or lock with counterholder - MP 1-310- .
- install (set the timing) ⇒ [page 23](#) .
- Top up with engine oil and check the oil level ⇒ Maintenance ; Booklet Octavia II .

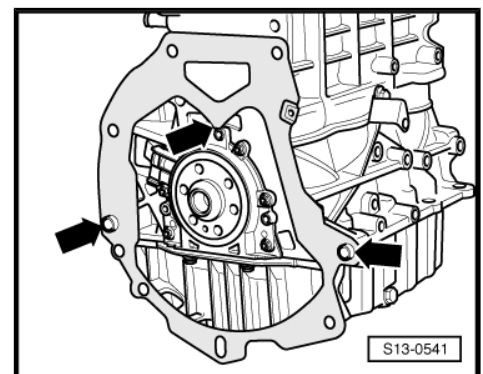
2.3 Replacing the sealing flange (gearbox side)

Special tools and workshop equipment required

- ◆ Assembly tool - T10134-
- ◆ Screw M6 x 35 (3x)
- ◆ Screw M7 x 35 (2x)
- ◆ Feeler gauges
- ◆ Steel straightedge

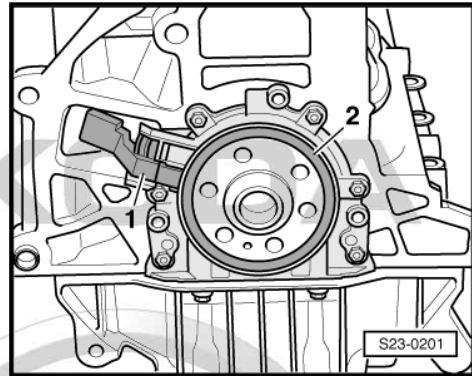
2.3.1 Removing

- Gearbox removed.
- Remove the two-mass flywheel ⇒ [page 43](#) .
- Remove the intermediate plate from the dowel sleeves and unhook from sealing flange -arrows-.
- Position crankshaft to TDC for cylinder 1 ⇒ [page 26](#) .
- Removing the oil pan ⇒ [page 87](#) .

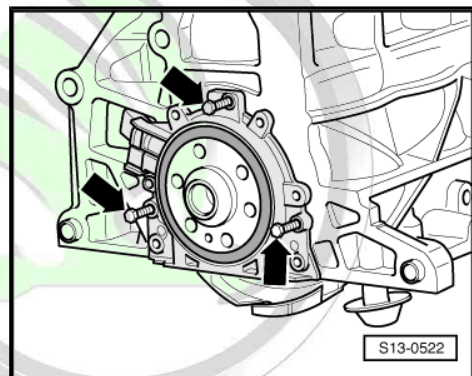




- Remove engine speed sender - G28- -1-.
- Unscrew fixing screws of the rear sealing flange.



- Screw 3 screws M6 x 35 mm into the threaded bores of the sealing flange -arrows-.
- Press out sealing flange together with rotor from the crankshaft by alternately screwing the screws into the sealing flange.



2.3.2 Installing



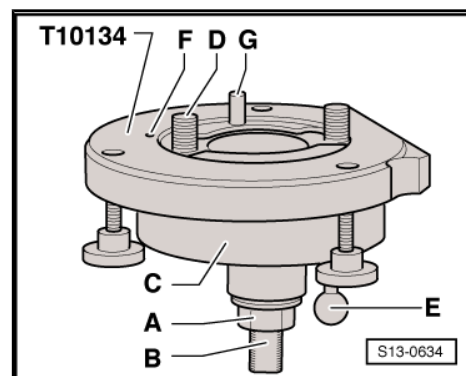
Note

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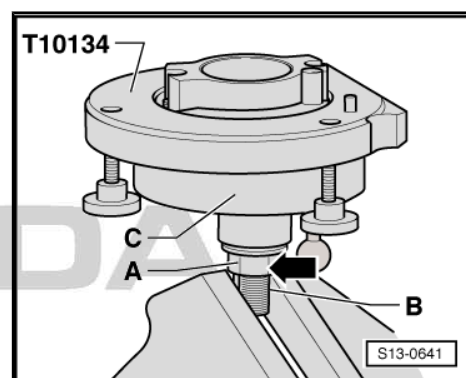
- ◆ *The sealing flange with a PTFE seal is equipped with a sealing lip support ring. This support ring serves as a fitting sleeve and must not be removed prior to installation.*
- ◆ *Do not separate or turn the sealing flange and rotor after removing them from the spare part package.*
- ◆ *The rotor gets its fitting location by fixing by fixing to the positioning pin of the assembly tool - T10134- .*
- ◆ *Sealing flange and sealing ring form one unit and must only be renewed together with the transmitter wheel.*
- ◆ *The rotor has an elastomer layer on its sealing surface with the crankshaft. This layer must not be brought into contact with dirt or grease.*
- ◆ *The assembly tool - T10134- is given its fitting location to the crankshaft by means of a guide bolt, which is guided into the threaded bore of the crankshaft.*

A - Mounting sealing flange with rotor on the assembly tool - T10134-

- A - Hexagon nut
- B - Clamping surface
- C - Assembly cup
- D - Allan screw
- E - Guide bolts (with red handle - for fuel engine)
- F - Positioning pin
- G - Guide bolts (with black handle - for diesel engine)



- Grip the assembly tool - T10134- on the clamping surface -B- of the threaded spindle in a vice.

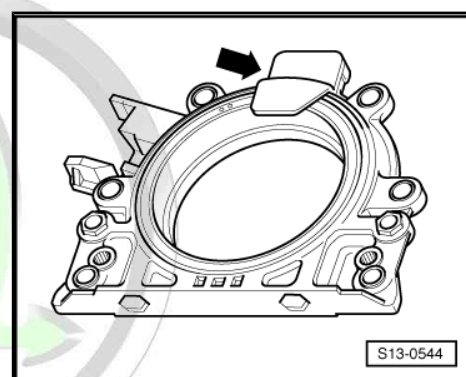


- Remove securing clip -arrow- from new sealing flange.

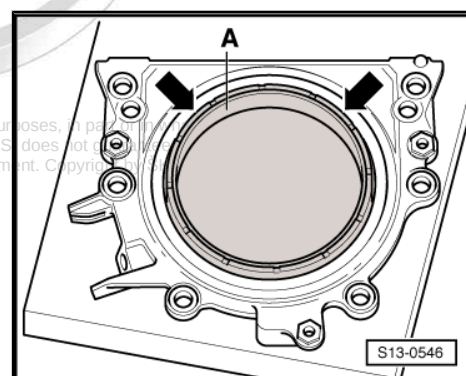


Note

Do not remove the rotor from the sealing flange or turn it.

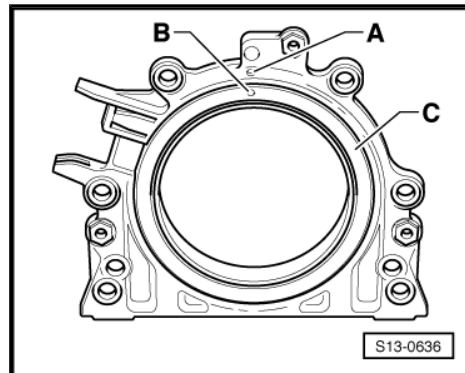


- Place sealing flange with front side facing down on a clean level surface.
- Press the sealing lip supporting ring -A- -arrows-, until it rests on the level surface.
- The top edge of the rotor and the front edge of the sealing flange must be flush.





The locating hole -B- on the rotor -C- must be flush with the marking -A- on the sealing flange.

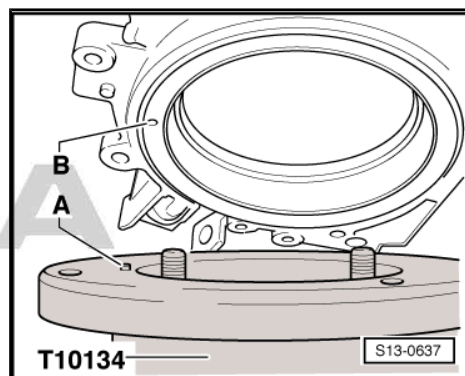


- Lay the sealing flange with the front side on the assembly tool - T10134- in such a way that the positioning pin -A- engages into the hole -B- of the rotor.



Note

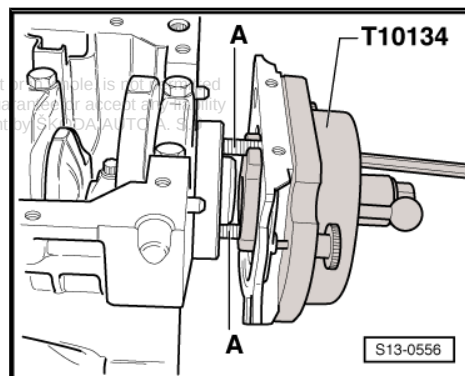
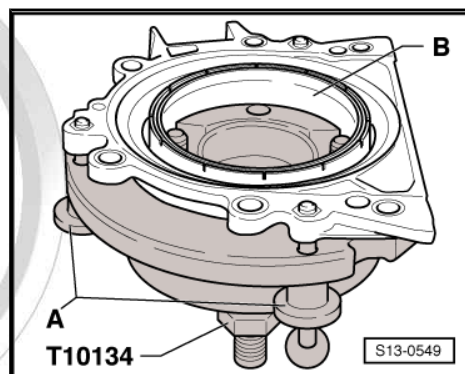
Make sure the sealing flange lies flat on the assembly device.



- When tightening the knurled screws -A- press the sealing lip supporting ring -B- on the surface of the assembly tool - T10134- in such a way that the positioning pin can no longer slide out of the rotor hole.

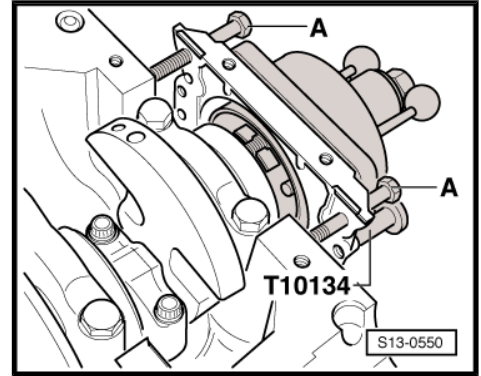
B - Mounting the assembly tool - T10134- with sealing flange on the crankshaft flange

- The crankshaft flange must be free of grease and oil
- Crankshaft is at TDC for cylinder 1
- Unscrew hexagon nut up to the end of the threaded spindle.
- Screw assembly tool - T10134- with Allan screws -A- up to the stop onto the crankshaft flange.

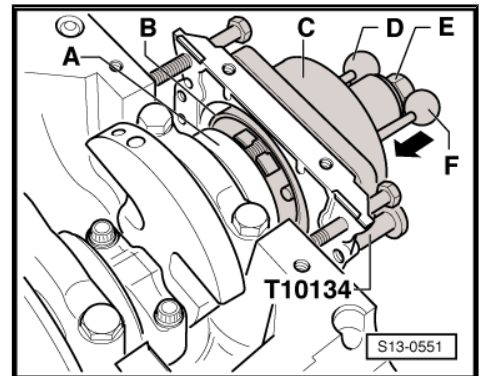


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- Screw in two screws M7 x 35 mm -A- by about 3 thread turns for the sealing flange guide into the cylinder block.



- Move the assembly cup -C- by hand in the -direction of the arrow- until the rotor -B- rests on the crankshaft flange -A-. Subsequently insert the guide bolt with black ball -D- fully into the threaded bore of the crankshaft. If the guide bolt is correctly pushed in, then the handle has a distance of approx. 10 mm from the assembly cup -C-. This gives the rotor its final installation position.
- Screw in hexagon nut -E- by hand onto the threaded spindle until it rests against the assembly cup -C-.



i Note

The guide bolt for petrol engines (red handle) -F- must not be fitted into the threaded hole of the crankshaft.

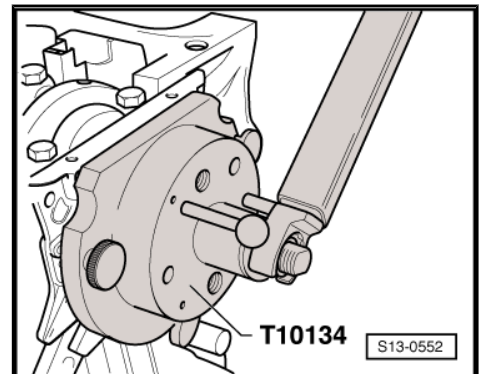
C - Pressing the rotor onto the crankshaft flange

- Tighten the hexagon nut of the assembly tool - T10134- using a torque wrench with adapter. Tightening torque: 35 Nm.

i Note

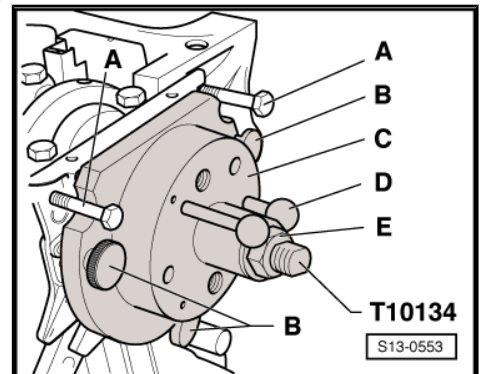
After tightening the nut to 35 mm there must still be a narrow air gap between the cylinder block and the sealing flange.

D - Inspect the fitting position of the rotor on the crankshaft



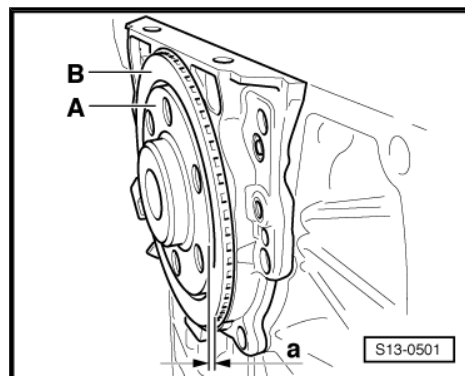
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- Unscrew hexagon nut -E- up to the end of the threaded spindle.
- Release both screws -A- to the guide from the cylinder block.
- Unscrew three knurled screws -B- from the sealing flange.
- Unscrew two Allan screws and remove assembly device.
- Remove sealing lip support ring.





The fitting position of the rotor on the crankshaft is accurate if there is a distance -a- of 0.5 mm between the crankshaft flange -A- and the rotor -B-.



- Position the steel straight edge onto the crankshaft flange.
- Measure the distance between the steel straightedge and the rotor with a feeler gauge.

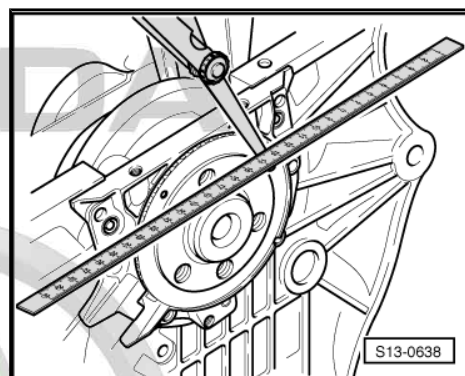
If the measured distance is less than 0.5 mm:

- Press down rotor ➔ [page 42](#) .

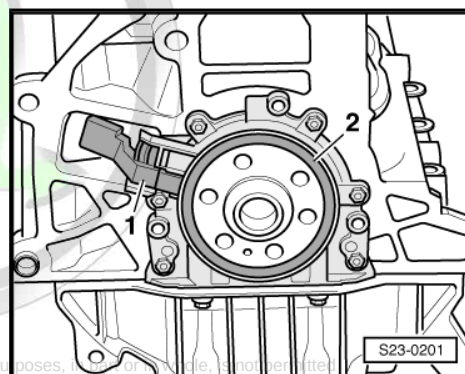
If the dimension is correct:

- Tighten the new fixing screws of the sealing alternately cross-wise.

Tightening torque: 15 Nm.

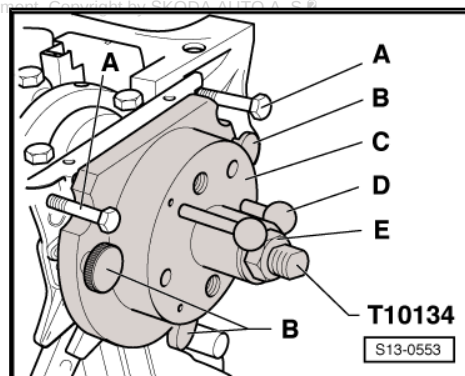


- Install engine speed sender - G28- -1-. Tightening torque: 5 Nm.
- Installing the oil pan ➔ [page 87](#) .
- Installing intermediate plate.
- Install flywheel with new screws. Tighten fixing bolts to 60 Nm and torque a further 1/4 turn (90°).



E - Pressing down the rotor

- Screw assembly tool - T 10134- with Allan screws up to the stop onto the crankshaft flange.
- Screw in three knurled screws -B- into the flange.
- Subsequently insert the guide bolt with black ball -D- fully into the threaded bore of the crankshaft. If the guide bolt is correctly positioned, then the handle has a distance of approx. 10 mm from the assembly cup -C-.
- Screw in hexagon nut -E- by hand onto the threaded spindle until it rests against the assembly cup.



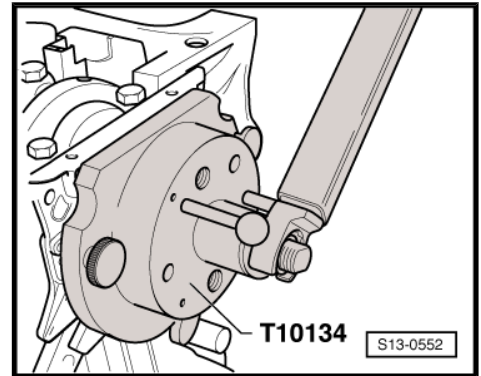
- Tighten the hexagon nut of the assembly tool using a torque wrench with adapter.

Tightening torque: 40 Nm.

- Check the fitting position of the rotor on the crankshaft again
⇒ [page 41](#) .

If the dimension -a- is too small again:

- Tighten the hexagon nut of the assembly device to 45 Nm.
- Check the fitting position of the rotor on the crankshaft again
⇒ [page 41](#) .



2.4 Removing and installing the two-mass flywheel

Special tools and workshop equipment required

- ◆ Counterholder - MP1-223 (3067)-

or

- ◆ Engine mount - MP 1-202 (VW 540)-
- ◆ Bushing - T30010 (VW 540/1B)-
- ◆ Flywheel lock - MP 1-504-

Removing

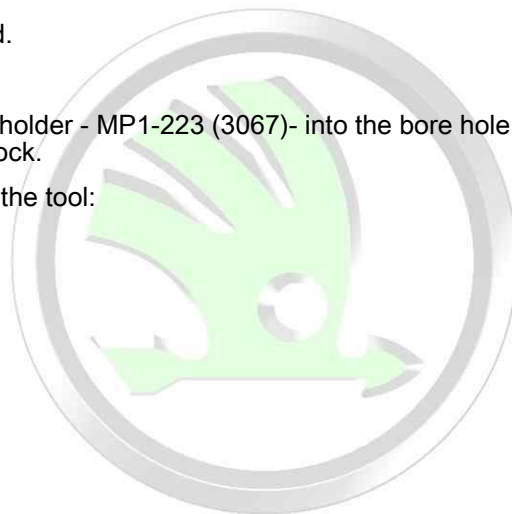
- Gearbox removed.

Engine installed

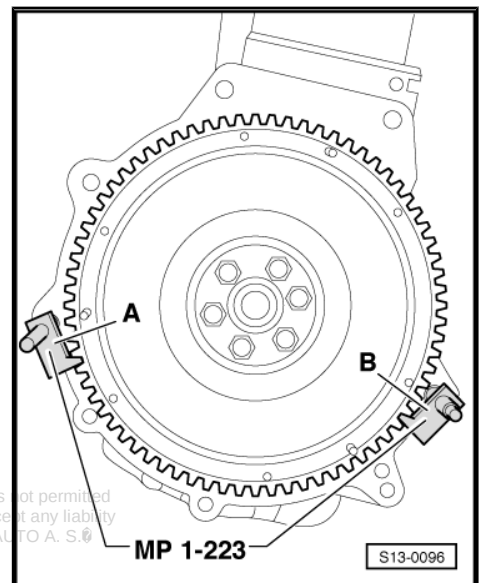
- Insert the counterholder - MP1-223 (3067)- into the bore hole on the cylinder block.
- Fitting position of the tool:

A - for tightening

B - for slackening

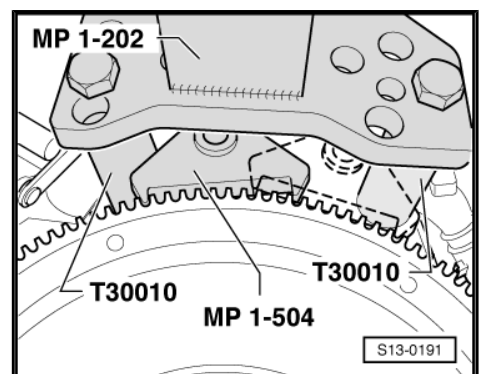


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Engine removed

- Position the flywheel lock - MP 1-504- on the starter ring gear and turn crankshaft until it rests against the sleeve - T30010- .





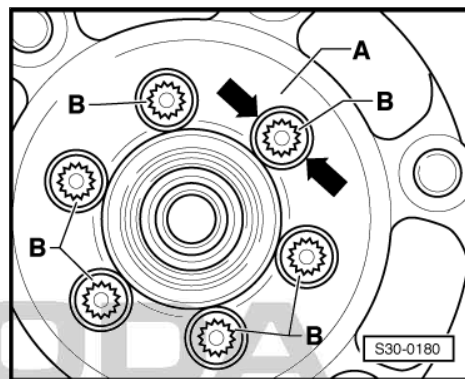
Continued for all

- Rotate the secondary side -A- of the two-mass flywheel in such a way that the screws -B- are positioned in the middle of the holes -arrows-.



Caution

When unscrewing the screws -B-, ensure that no screw head catches on the secondary side -A- of the two-mass flywheel, otherwise it will be damaged.



- Release screws -B- and remove two-mass flywheel.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

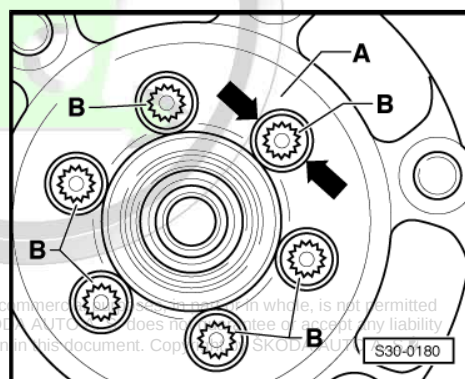


Note

Use new screws for attaching.

- Rotate the secondary side -A- of the two-mass flywheel in such a way that the screws -B- are positioned in the middle of the holes -arrows-.

1. Screw in all the screws -B- by hand.
2. First of all tighten all the screws -B- crosswise to 60 Nm.
3. Then torque all the screws -B- crosswise a further 90° (1/4 turn.)



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3 Crankshaft, Piston and Conrod

3.1 Removing and installing crankshaft



The engine should be attached to the engine repair stand with the engine holder - MP 1-202- for carrying out removal and installation work.

1 - Bearing shell

- ☐ for cylinder block with lubricating groove
- ☐ do not mix up used bearing shells (mark)

2 - Drive chain sprocket

- ☐ for oil pump
- ☐ Removing and installing
⇒ [page 46](#)

3 - Bearing shell

- ☐ for bearing cap without lubricating groove
- ☐ do not mix up used bearing shells (mark)

4 - Thrust washers

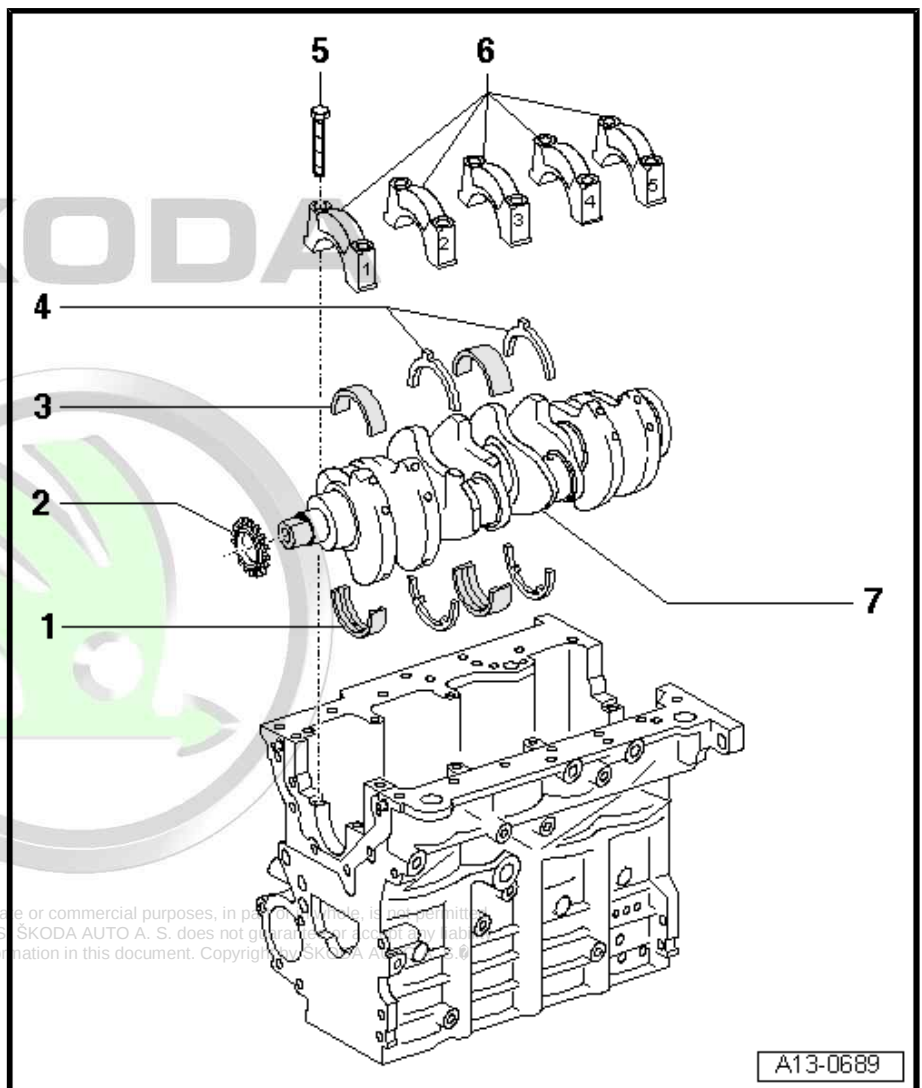
- ☐ for bearing 3
- ☐ different versions for bearing cap and cylinder block
- ☐ pay attention to locating element

5 - 65 Nm + torque a further 90° (1/4 turn)

- ☐ replace

6 - Bearing caps

- ☐ Bearing cap 1: belt pulley side
- ☐ bearing cap 3 with recesses for thrust washers
- ☐ retaining lugs of the bearing shells of the cylinder block/bearing cap must be on top of one another



A13-0689

7 - Crankshaft

- ☐ with chain sprocket for oil pump drive
- ☐ Axial play when new: 0.07...0.17 mm, wear limit: 0.37 mm
- ☐ Crankshaft bearing pin: $\varnothing$ 54.00 mm
- ☐ Conrod bearing pin: $\varnothing$ 50.90 mm

3.2 Removing and installing drive chain sprocket

Special tools and workshop equipment required

- ◆ Drive bushing - MP1-316 (30 - 100)-
- ◆ Two-arm extractor, standard commercially available
- ◆ Protective gloves

Removing

- Remove sealing flange (on belt pulley side) ⇒ [page 35](#) .
- Remove chain tensioner, chain and chain sprocket for oil pump.
- Remove drive chain sprocket for crankshaft with two-arm extractor -2-. At the same time protect the crankshaft journal with a suitable washer -1-.

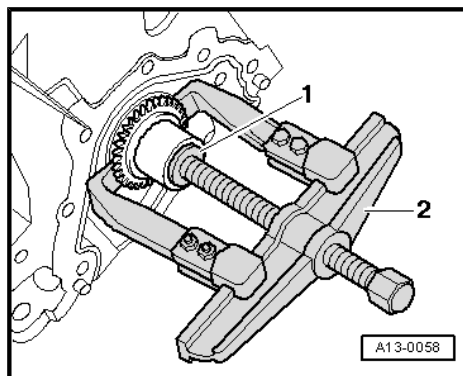
Installing

Installation occurs in reverse order to removal. Pay attention to the following:

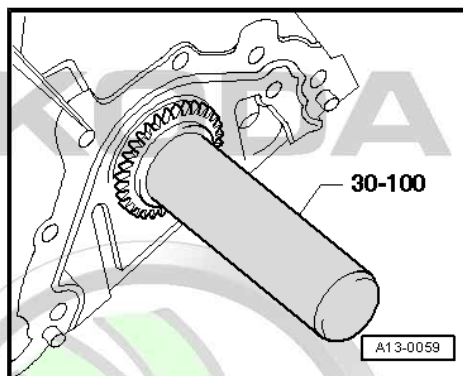


WARNING

Wear protective gloves!



- Heat up the drive chain sprocket in an oven for about 15 minutes to 220 °C.
- Place the drive chain sprocket on the shaft end using pliers and with bushing - 30 - 100- slide on until the stop on the crankshaft is reached.
- Fitting position: the broader collar of the drive chain sprocket (45° chamfer in the hole) points to the engine.



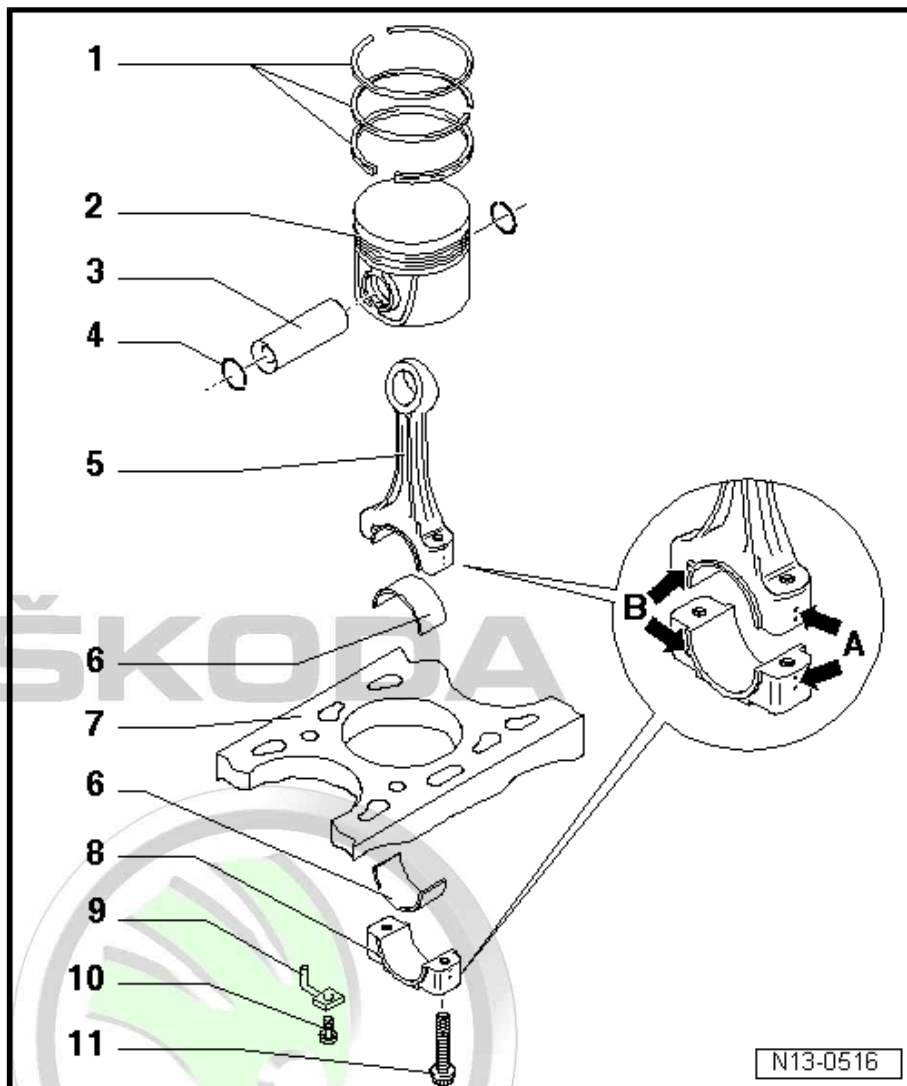
3.3 Disassembling and assembling pistons and conrods

1 - Piston rings

- ☐ Offset gaps by 120°.
- ☐ use piston ring pliers for removing and installing
- ☐ marking "TOP" faces piston crown
- ☐ Check ring gap
⇒ [page 48](#)
- ☐ Check end clearance
⇒ [page 48](#)

2 - Piston

- ☐ with combustion chamber
- ☐ Mark the installation position and the assignment to cylinder
- ☐ Installation position and assignment of piston/ cylinder ⇒ [page 49](#)
- ☐ arrow on the piston crown faces towards the belt pulley side
- ☐ replace piston if there is any sign of crack formation on the piston body
- ☐ Inspecting piston
⇒ [page 49](#)
- ☐ Piston dimension: $\varnothing$ 80.96 mm
- ☐ Install using piston ring tensioning strap
- ☐ inspect piston projection at TDC ⇒ [page 50](#)



3 - Piston pin

- ☐ if stiff, heat piston to approx. 60°C
- ☐ use drift - VW 222A- for removing and installing

4 - Circlip

5 - Connecting rod

- ☐ always replace as a set only
- ☐ Mark assignment to cylinder -A-
- ☐ Fitting position: markings -B- point towards the belt pulley side
- ☐ with a split bearing cap
- ☐ separate new conrod ⇒ [page 50](#)

6 - Bearing shell

- ☐ Fitting position ⇒ [page 50](#)
- ☐ do not mix up already used bearing shells (mark)
- ☐ Observe version: top bearing shell (towards the piston) must be made from a long lasting material, recognition feature for new bearing shells: black marking on the contact surface near the separation point
- ☐ insert in middle ⇒ [page 50](#)
- ☐ check for firm seating
- ☐ Axial play wear limit: 0.37 mm

7 - Cylinder block

- ☐ Inspect cylinder ⇒ [page 49](#)
- ☐ Cylinder dimension: $\varnothing$ 81.01 mm



8 - Connecting rod bearing cap

- ☐ Check fitting position
- ☐ cracked cover fits only in one position at the relevant conrod

9 - Oil spray jet

- ☐ for cooling pistons

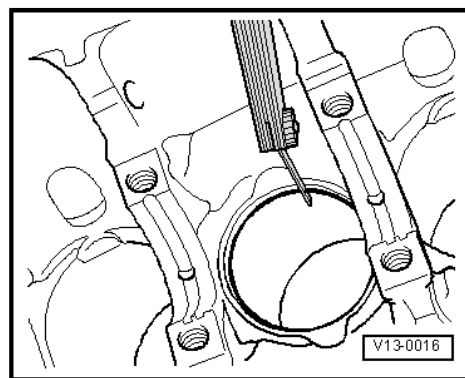
10 - 25 Nm

- ☐ replace without sealant

11 - Conrod bolt, 30 Nm + torque a further + 90° (1/4 turn)

- ☐ replace
- ☐ Oil threads and contact surface.

Checking piston ring gap

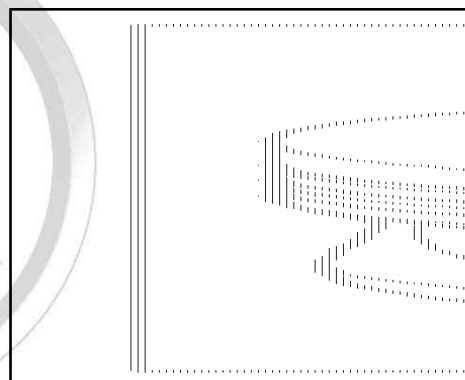


Special tools and workshop equipment required

- ◆ Feeler gauges
- Insert ring at right angles from above down into lower cylinder bore, about 15 mm away from edge of cylinder. To insert use piston without rings.

Piston ring (dimensions in mm)	New	Wear limit
1st compression ring	0.20 - 0.40	1.00
2nd compression ring	0.20 - 0.40	1.00
Oil scraper ring	0.25 - 0.50	1.00

Checking ring-to-groove clearance



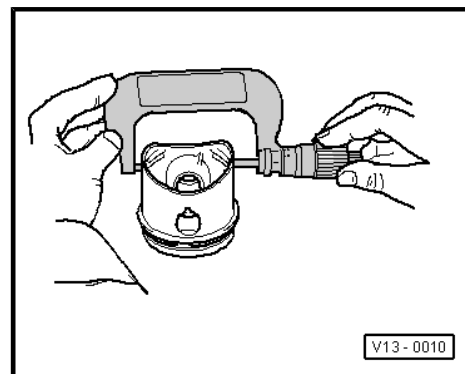
Special tools and workshop equipment required

- ◆ Feeler gauges
- Clean before inspecting the annular grooves of the piston.

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Piston ring (dimensions in mm)	New	Wear limit
1st compression ring	0.06 - 0.09	0.25
2nd compression ring	0.05 - 0.08	0.25
Oil scraper ring	0.03 - 0.06	0.15

Inspecting piston



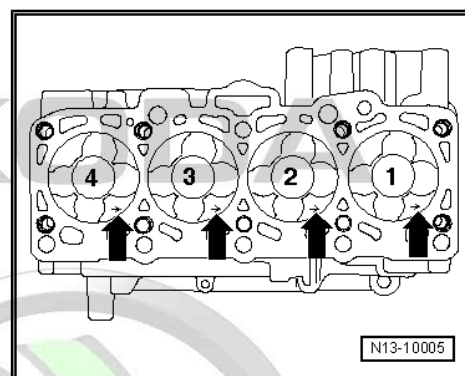
Special tools and workshop equipment required

- ◆ External micrometer
- Measure about 10 mm from the lower edge, offset at right angles to the piston pin shaft.
- Max. deviation from specified dimension: 0,04 mm

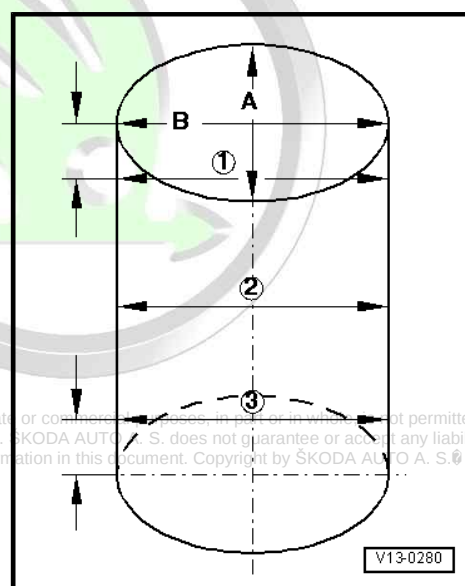
Installation position and assignment of piston/cylinder

Pistons in cylinders 1...4:

- The arrow on the piston crown -arrows- faces towards the belt pulley side.



Checking cylinder bores



Special tools and workshop equipment required

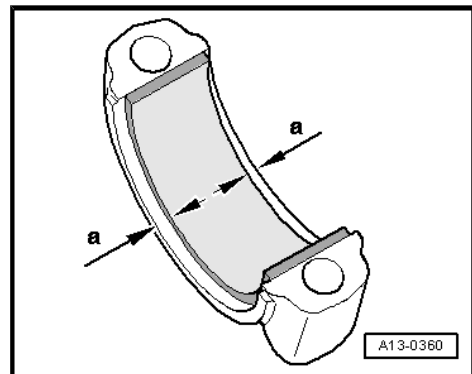
- ◆ Cylinder gauge

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- Measure cylinder at 3 points crosswise in transverse direction -A- and lengthwise -B-.
- Max. deviation from specified dimension: 0,10 mm

Installation position of ball sockets in conrods

- Insert bearing shell in the conrod or in the center of the conrod bearing cap.
- Dimension -a-: 2.5 mm



3.4 inspect piston projection at TDC

Special tools and workshop equipment required

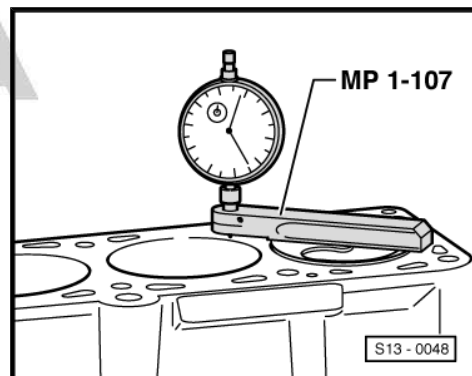
- ◆ Measuring tool for liner pretension - MP 1-107-

Test sequence

When fitting new pistons or a partial engine, check the piston projection in TDC on all pistons.

Depending on the piston projection fit the relevant cylinder head seal in accordance with the table below.

Piston projection over cylinder block top side mm	Marking of bores
0.91 - 1.00	1
1.01 - 1.10	2
1.11 - 1.20	3



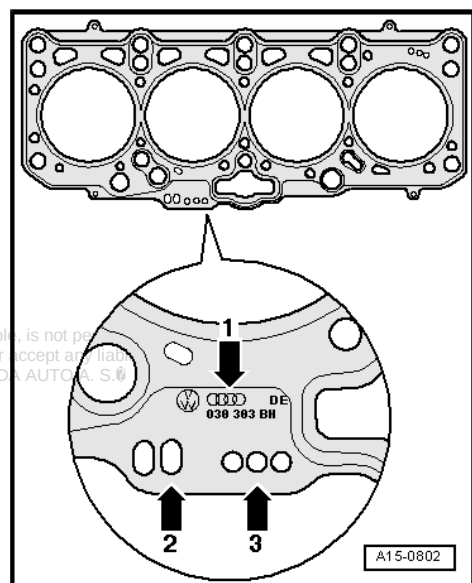
Identification of the cylinder head gasket

- ◆ Part number = -arrow 1-
- ◆ Control code = -arrow 2- (ignore)
- ◆ Bores = -arrow 3-



Note

- ◆ Differing thicknesses of cylinder head gaskets are inserted according to the piston projection. When replacing the seal, use a new seal with the same marking -arrow 3-.
- ◆ If different values are measured during the projection measurement of the piston, the greatest dimension applies for the seal assignment.



3.5 Separating new connecting rod

It can happen that on new conrods, the provided separation point is not completely cracked. If the conrod bearing cap cannot be removed by hand, proceed in the following manner:

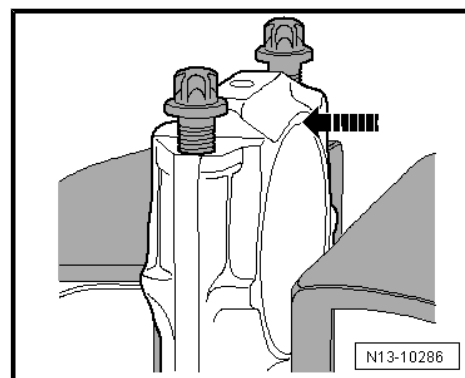
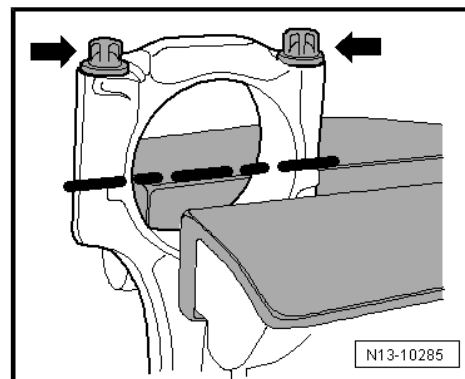
- Mark the assignment of the connecting rod to the cylinder.

- Slightly clamp the conrod, as shown in the illustration, in a vice with aluminium protective jaws.



Note

- ◆ *Only tension the conrod slightly in order to avoid damage on the conrod.*
- ◆ *The conrod is clamped below the broken line.*
- Unscrew both screws -arrows- by approx. 5 turns.
- Knock against the conrod bearing cap with a plastic hammer in -direction of arrow- in order to loosen it.



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15 – Cylinder head, valve gear

1 Removing and installing cylinder head



Note

- ◆ *Cylinder heads with cracks between the valve seats may continue to be used without any reduction in the life time provided the cracks are slight and max. 0.5 mm wide.*
- ◆ *It is not permissible to rework the cylinder heads of diesel engines.*
- ◆ *Replace O-rings and gaskets.*
- ◆ *Replace cylinder head bolts and screws which have been tightened to a torquing angle.*
- ◆ *When installing an exchange cylinder head with the camshafts installed, it is necessary to oil the contact surfaces between the roller arms and the cams after installing the head.*
- ◆ *Do not remove the plastic bases supplied as a protection for the open valves until just before fitting on the cylinder head.*
- ◆ *When replacing the cylinder head, replace all the coolant ⇒ [page 96](#) .*
- ◆ *If the engine is damaged and there is a suspicion that this damage was caused due to a mixture of oil with fuel (engine odour test), then it is essential to check whether the tandem pump is sealed on the inside ⇒ [page 116](#) ,*
- ◆ *Change contaminated engine oil ⇒ Maintenance ; Booklet Octavia II .*

1.1 Summary of components

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1 - Rear toothed belt guard

2 - Rubber bowl

- ☐ Replace if damaged.

3 - Pin screw, 10 Nm

4 - Hub

- ☐ for intake camshaft with rotor for Hall sender - G40-
- ☐ to remove use extractor - T10052-

5 - 100 Nm

- ☐ to release and tighten use counterholder - T10051-

6 - Hub

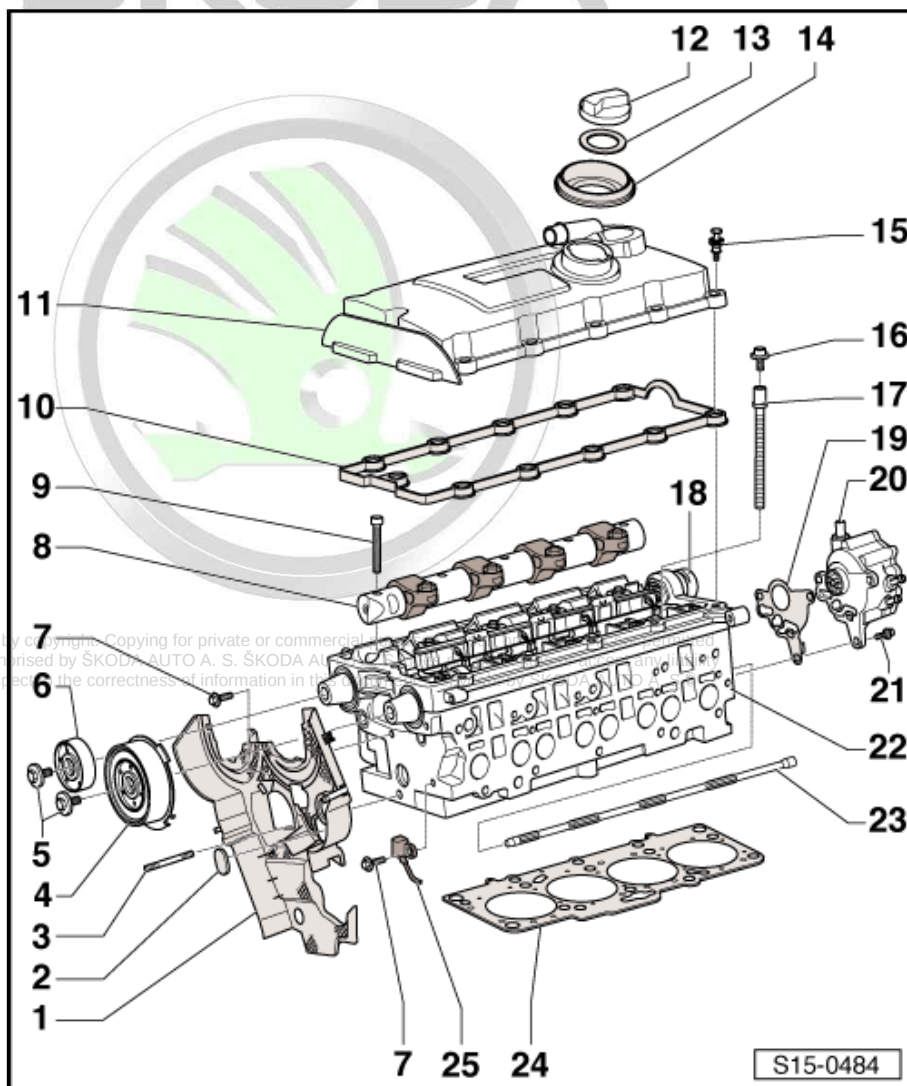
- ☐ For exhaust camshaft.
- ☐ to remove use extractor - T10052-

7 - 10 Nm

- ☐ insert using locking agent - D 000 600 A2-

8 - Valve-lever shaft

- ☐ Mark the installation position of the valve lever.
- ☐ Do not interchange
- ☐ Removing and installing ⇒ [page 56](#)
- ☐ Before installation, check that all ball studs and O-rings are inserted in the unit injectors



9 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ pay attention to order for slackening ⇒ [page 57](#)
- ☐ Pay attention to sequence and procedure when tightening ⇒ [page 63](#)

10 - Gasket for cylinder head cover

- ☐ replace if damaged or leaking
- ☐ remove and install on spacer sleeves (Pos. 15)

11 - Cylinder head cover

- ☐ Removing and installing ⇒ [page 55](#)

12 - Screw cap

13 - Gasket

- ☐ replace if damaged or leaking

14 - Sealing sleeve

15 - Screw with spacer sleeve, 10 Nm

- ☐ Pay attention to sequence for loosening and tightening ⇒ [page 55](#)

16 - 20 Nm

17 - Cylinder head screw

- ☐ replace



- ☐ pay attention to order for slackening ⇒ [page 57](#)
- ☐ Pay attention to sequence and procedure when tightening ⇒ [page 64](#)

18 - Multipin plug connection

- ☐ central for unit injectors
- ☐ when removing from the bearing frame, disconnect the connector by turning anti-clockwise

19 - Gasket

- ☐ replace

20 - Tandem pump

- ☐ Removing and installing ⇒ [page 113](#)
- ☐ Check ⇒ [page 115](#)

21 - 20 Nm

22 - Cylinder head

- ☐ Removing ⇒ [page 57](#)
- ☐ check for distortion ⇒ [page 54](#)
- ☐ installing ⇒ [page 63](#)
- ☐ After replacing, fill with fresh coolant ⇒ [page 96](#)

23 - Mixing tube

- ☐ inserted into cylinder head
- ☐ pull out with hook
- ☐ Installation position of mixing tube ⇒ [page 54](#)

24 - Cylinder head gasket

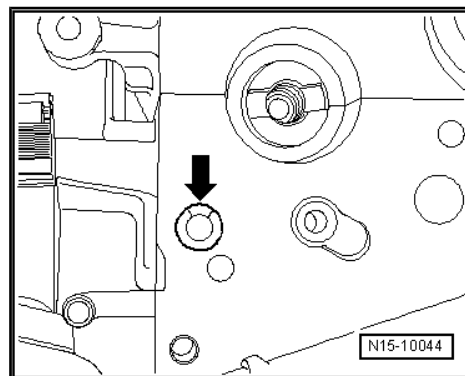
- ☐ Replace ⇒ [page 57](#)
- ☐ Pay attention to the marking ⇒ [page 55](#)

25 - Hall sender - G40-

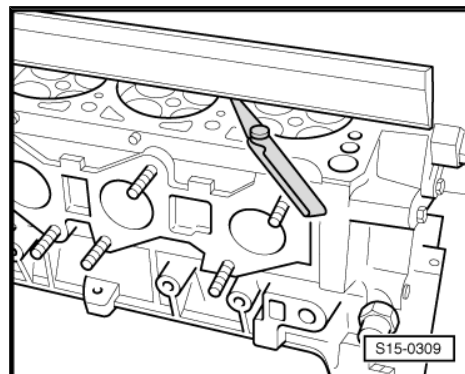
- ☐ for camshaft position

Installation position of mixing tube

The recess on the mixing tube points upwards -arrow-,



Checking cylinder head for distortion



Special tools and workshop equipment required

- ◆ Feeler gauges
- ◆ Knife-edge straightedge
- Inspect cylinder head at several points for distortion using a knife-edge straightedge and feeler gauge.
- Max. permissible distortion: 0,05 mm



Note

It is not permissible to rework the cylinder heads of diesel engines.

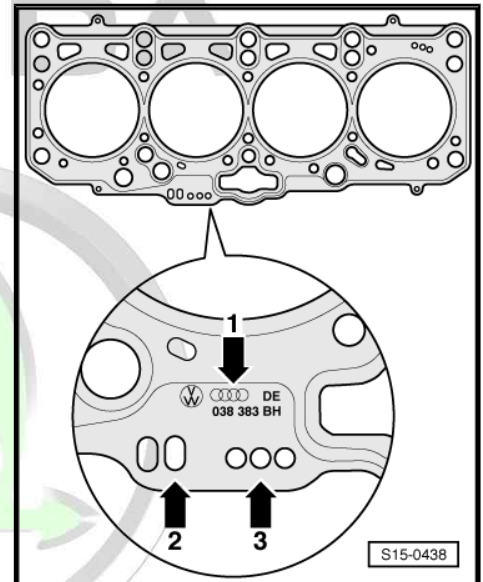
Identification of the cylinder head gasket

- ◆ Part number = -arrow 1-
- ◆ Control code = -arrow 2- (ignore)
- ◆ Bores = -arrow 3-



Note

Differing thicknesses of cylinder head gaskets are inserted according to the piston projection. If only the gasket is replaced, it must be replaced with a new gasket with the same marking.

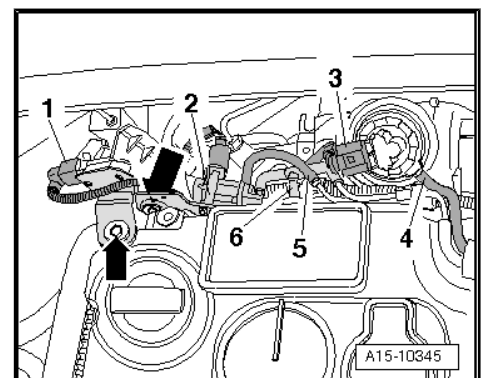


1.2 Removing and installing cylinder head cover

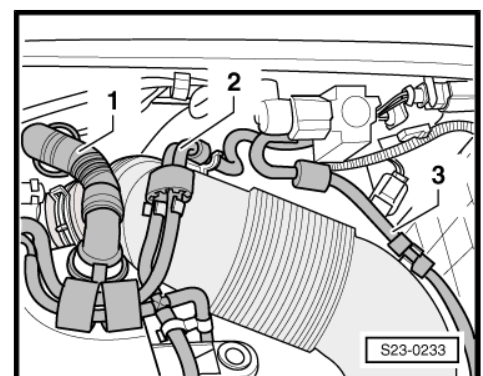
Removing

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- Remove engine cover ⇒ [page 13](#) .
- Loosen change-over valve for exhaust gas recirculation radiator - N345- -2- at the bracket..
- Disconnect the connectors -1- and -3- and expose the electrical cables.
- Disconnect the vacuum lines -4, 5, 6- and expose cables.
- Unscrew screws -arrows-.



- Detach the crankcase ventilation hose -1- from the cylinder head cover.



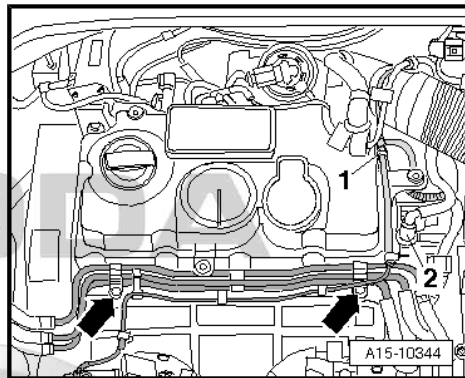


- Detach the vacuum hose -1- from the cylinder head cover.
- Release screws -arrows- and remove holder.

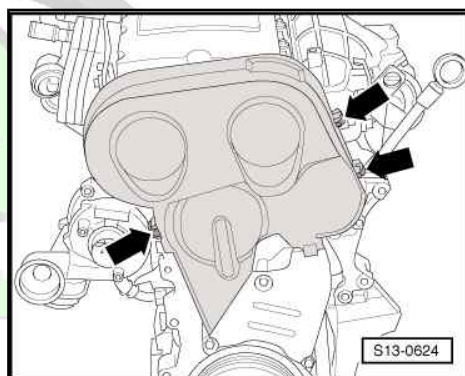


Note

Coolant hoses as well as fuel lines remain connected.



- Remove top toothed belt guard; to do so, release retaining clips -arrows-.



- Undo the screws for the cylinder head cover in the sequence -11...1-.
- Remove cylinder head cover with seal.

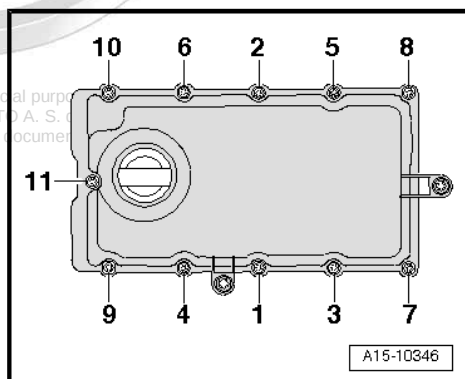
Installing

Installation occurs in reverse order to removal. Pay attention to the following:

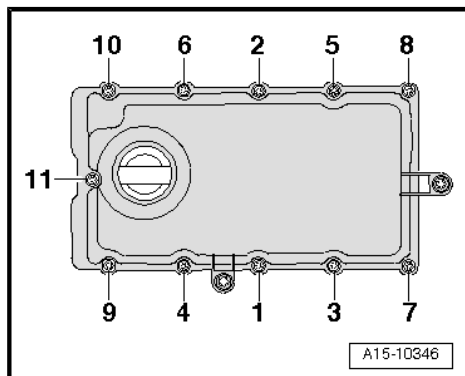


Note

Replace the gasket as well as the screws for the cylinder head cover in case of damage.



- Tighten the screws for the cylinder head cover in the sequence -1...1- initially by hand and then to 10 Nm.



1.3 Removing and installing cylinder head

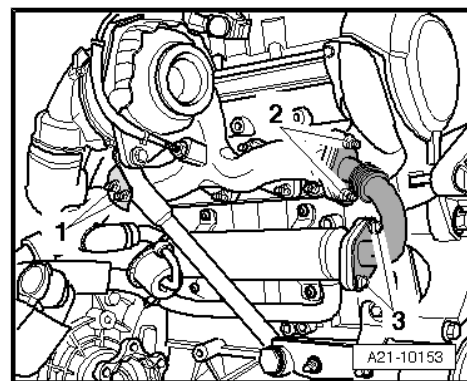
Special tools and workshop equipment required

- ♦ Lifting device - MP9-201 (2024 A)-
- ♦ Rig pin for the injection pump - 3359- or -MP 1-301- (2x)
- ♦ Counterholder - T10051 -

- ◆ Extractor - T10052-
- ◆ Locking pin - T10060A-
- ◆ Crankshaft arrester - T10100-
- ◆ Socket - T10264-
- ◆ Counterholder - T10265-
- ◆ Workshop crane , e.g. -VAS 6100-
- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Pliers for spring-type clips
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Locking agent - D 000 600 A2-
- ◆ Protective goggles
- ◆ Protective gloves

1.3.1 Removing cylinder head

- Switch off ignition and pull out ignition key.
- Remove air filter with air mass meter - G70- and inlet hose
⇒ [page 148](#) .
- Drain coolant ⇒ [page 96](#) .
- Remove toothed belt ⇒ [page 23](#) .
- Remove cylinder head cover ⇒ [page 55](#) .
- Unbolt heat shield for right drive shaft.
- Release nuts -2- and screws -3- and remove the connection pipe for exhaust gas recirculation.

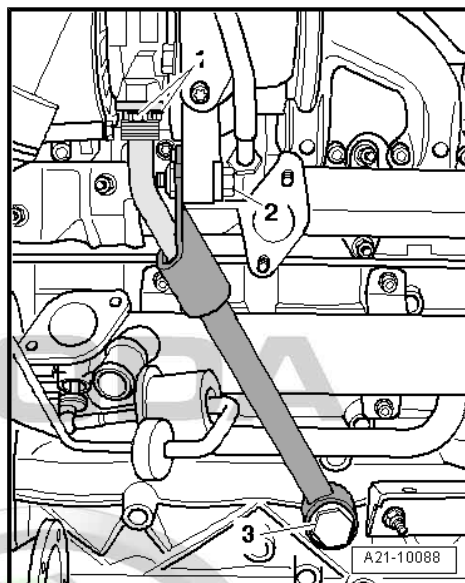


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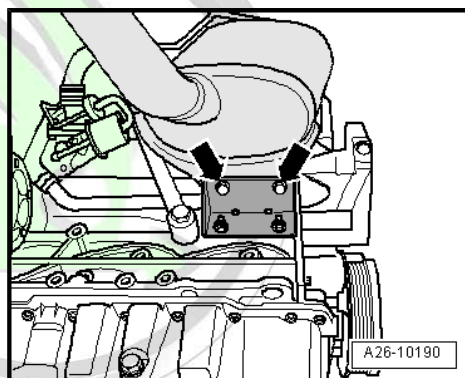




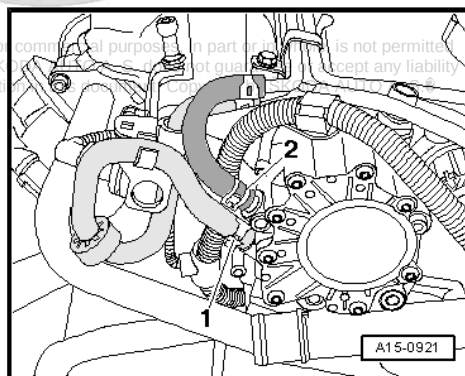
- Unscrew screw -2- and hollow screw -3-.
- Rotate the turbocharger support 90° and pull it down and out of the oil return line.



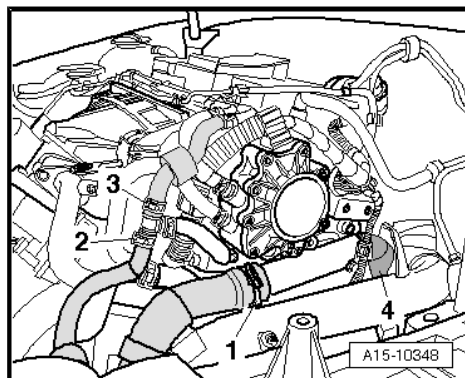
- Release screws -arrows- at holder for diesel particle filter.
- Safety instructions when working on the injection system
⇒ [page 3](#) .



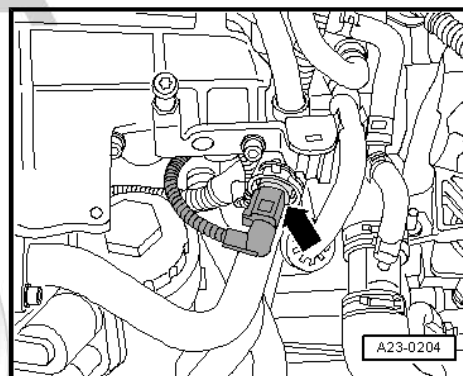
- Detach fuel intake hose -2- (marked in white) and fuel return-flow hose -1- (marked in blue) from the tandem pump.



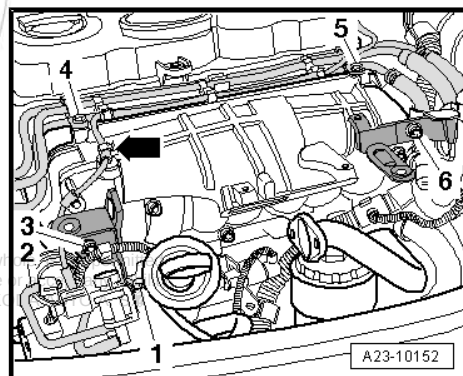
- Disconnect coolant hoses -1 ... 4-.



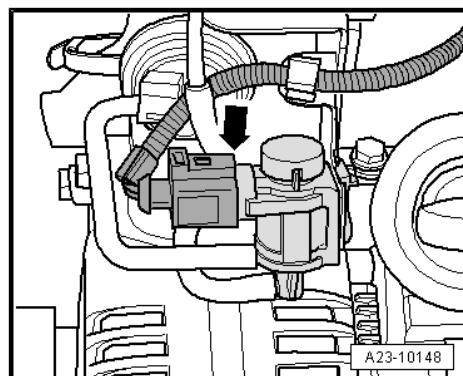
- Disconnect plug -arrow- at fuel temperature sender - G81- and expose electrical cable.



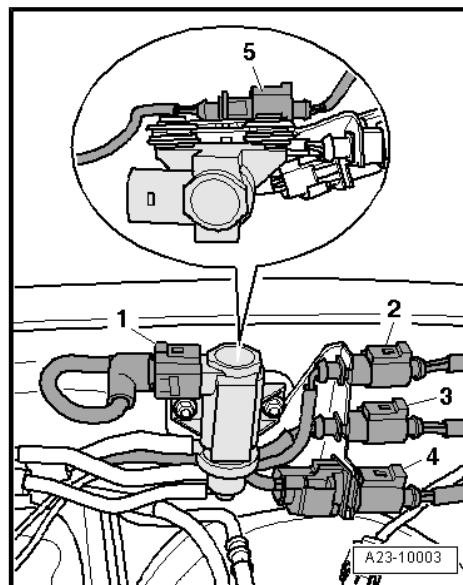
- Unclip the vacuum hose from the holder -arrow-.
- Release screw -1-.
- Disconnect the vacuum hose -2- to the vacuum actuator for charge pressure control.



- Detach the valve for intake manifold - N316- -arrow- from the holder.
- Remove exhaust gas recirculation valve - N18- ➔ [page 160](#) .

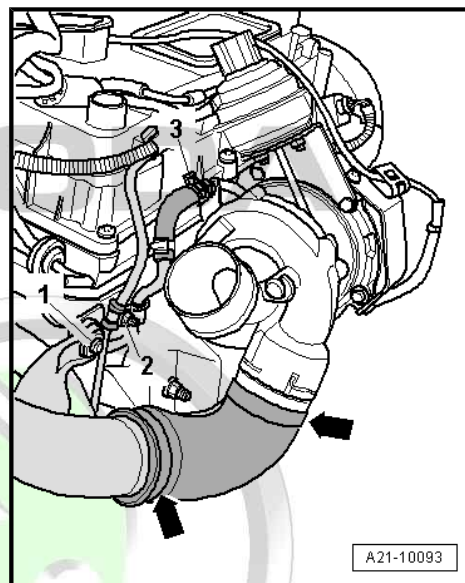


- Disconnect plug connection -3- for exhaust gas temperature sender 1 - G235- (temperature sender upstream turbocharger - G507-) and expose cable.

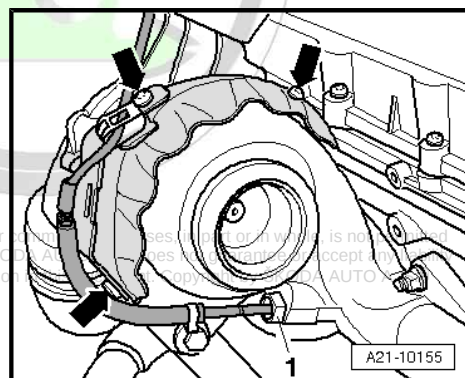




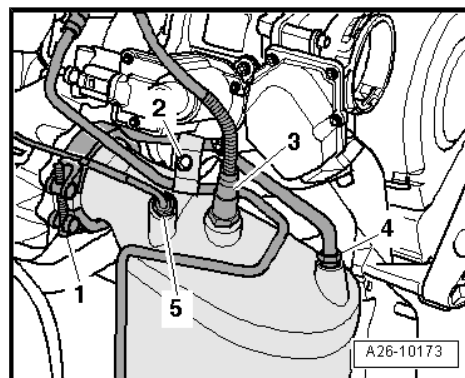
- Remove oil feed line -3- from the exhaust gas turbocharger.
- Release screw -1-.
- Undo retaining clips -arrow- and remove the charge air hose.
- Remove nut - 2 -.
- Push the vacuum line slightly to the left.



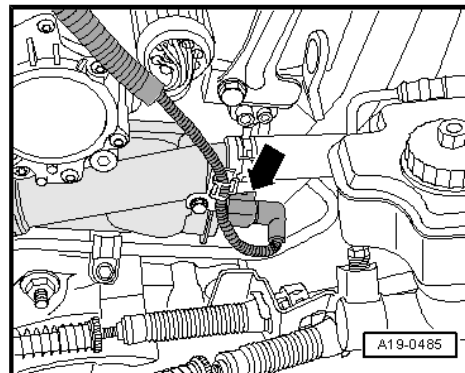
- Place the electric cable to exhaust gas temperature sender 1 - G235- (temperature sender upstream of turbocharger - G507-) -1- to one side.



- Undo and remove retaining clip -1- for diesel particulate filter.
- Push diesel particulate filter slightly backwards.

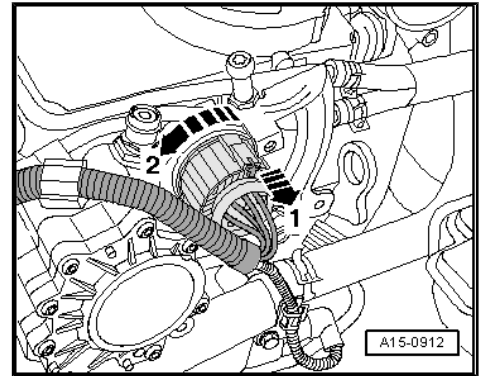


- Disconnect plug -arrow- at the coolant temperature sender - G62- .

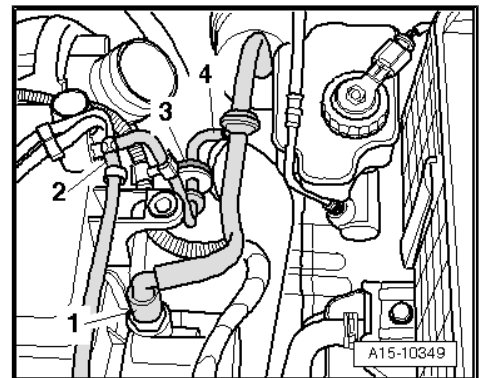


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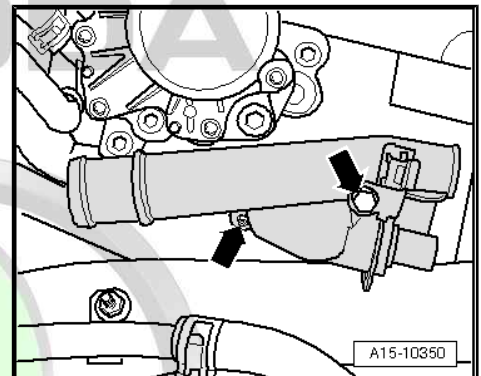
- Pull the release mandrel in -arrow direction 1- and open the knurled nut in -arrow direction 2-.
- Disconnect the central plug connection for unit injectors and ceramic glow plugs and uncover the wiring harness.



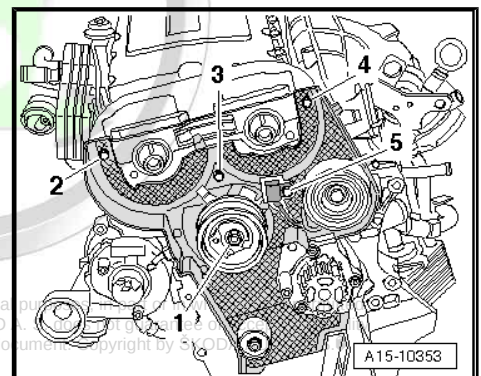
- Remove vacuum hose -1- on the tandem pump.
- Remove vacuum hose -4- at non-return valve.
- Disconnect vacuum hose -2-.
- Push rubber grommet -3- out of the lifting eye on the engine.



- Unscrew coolant nozzles -arrows-.
- Remove camshaft sprockets and remove hubs for camshafts
⇒ [page 24](#) .



- Unscrew screws -2...4-.
- Unscrew screw -5- and remove Hall sender - G40- from cylinder head.
- Unscrew nut -1- for tensioning pulley.



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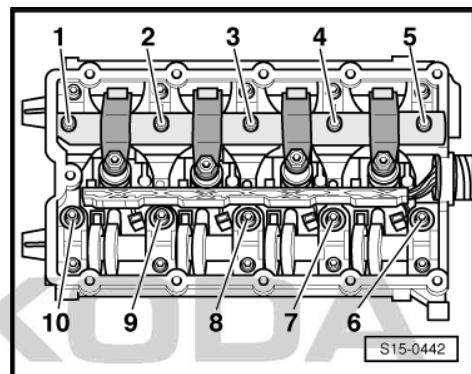
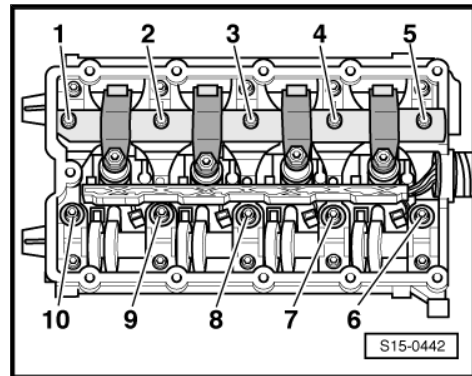
- Remove screws -1-, -3- and -5-.
- Undo screws -2- and -4- and alternately remove in several stages.



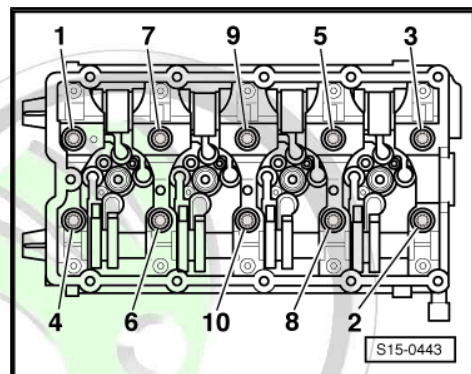
Note

Do not remove the screws from the valve lever shaft in order that the individual parts remain attached to the valve lever shaft. Mark the allocation of individual parts if necessary.

- Remove valve-lever shaft.
- Unscrew screws -6...10- for bearing frame.



- Unscrew the cylinder head bolts in the order shown.

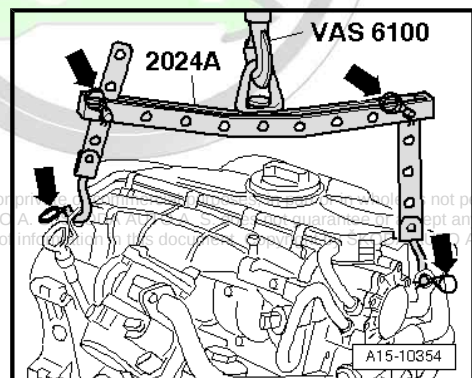


- Hang the lifting device for engine - 2024 A- onto the cylinder head.



WARNING

The suspension hooks and locking pins on the lifting device must be secured with plug-in locks -arrows-.



- Slightly raise cylinder head with workshop crane .
- Swivel the cylinder head to the left out of the rear toothed belt guard and simultaneously remove the tensioning pulley.
- Place the cylinder head down on a soft surface with the sealing surface facing upwards.
- Due to the high breakage susceptibility of the installed ceramic glow plugs, the cylinder head must never be placed on the sealing surface, as the ceramic glow plugs would then be protruding. Handling the ceramic glow plugs ➔ [page 166](#) .

1.3.2 Installing the cylinder head



Note

- ◆ *There must not be any oil or coolant present in the blind holes for the cylinder head bolts.*
- ◆ *Replace cylinder head bolts.*
- ◆ *When performing installation work replace the self-locking nuts.*
- ◆ *Replace screws which have been tightened to a torquing angle as well as sealing rings and seals.*
- ◆ *Remove the new cylinder head gasket from its wrapping immediately before fitting.*
- ◆ *Treat the seal with the utmost care. Damage to the silicone layer and in the area of the bead results in leakages.*
- ◆ *When installing an exchange cylinder head with the camshafts installed, it is necessary to oil the contact surfaces between the roller arms and the cams after installing the cylinder head.*
- ◆ *The plastic base for protecting the open valves should only be removed immediately before attaching the cylinder head.*
- ◆ *Secure all hose connections with corresponding hose clips.*



WARNING

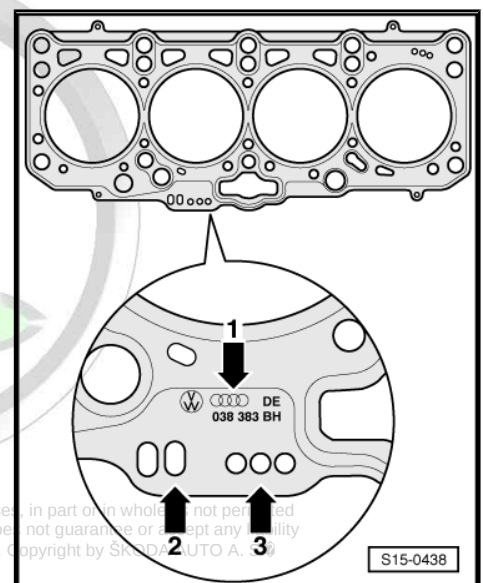
Wear protective gloves and goggles when working with gasket remover and degreasing agent!

- Make sure that when cleaning the cylinder head and cylinder block no foreign particles can get into the cylinder or into the oil and coolant galleries.
- Carefully remove old sealant residue from the cylinder head and cylinder block using a chemical sealant remover.
- Before fitting the cylinder head rotate the crankshaft so that all the pistons are almost evenly under TDC.
- Pay attention to the identification of the cylinder head seal.
- ◆ Part number = -arrow 1-
- ◆ Control code = -arrow 2- (ignore)
- ◆ Bores = -arrow 3-



Note

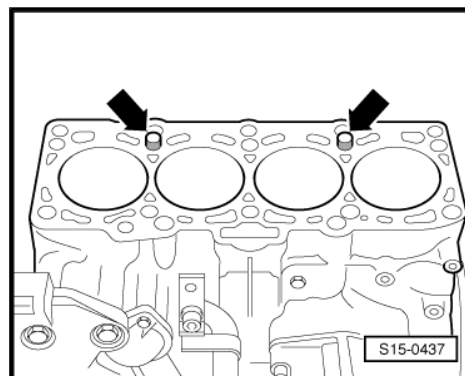
- ◆ *If the cylinder head seal or cylinder head are replaced, install a new cylinder head seal with the same identification marking.*
- ◆ *If parts of the crankshaft drive were replaced, then the new cylinder head gasket must be redefined by measuring the protrusion of the piston in TDC.*



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S15-0438

- Position the new cylinder heads.
- Pay attention to dowel sleeves -arrows- in cylinder block.
- Observe the installed position of the cylinder head gasket, the marking “above” or the part number must point to the cylinder head.

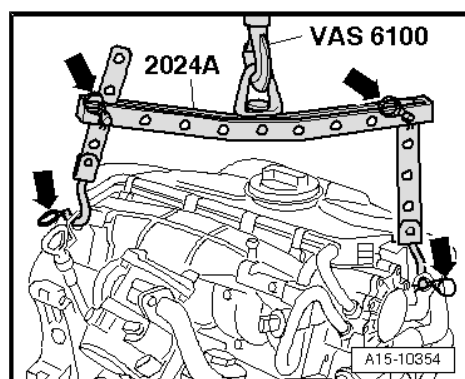


- Hang the lifting device for engine - 2024 A- onto the cylinder head.



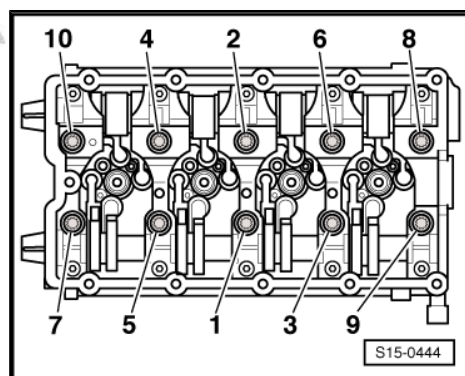
WARNING

The suspension hooks and locking pins on the lifting device must be secured with plug-in locks -arrows-.



- Slightly raise cylinder head with workshop crane .
- Insert the cylinder head with the toothed belt tensioning pulley pin screw into the recess in the rear toothed belt guard while simultaneously sliding on the tensioning pulley.
- Fit cylinder head onto cylinder block.
- Insert new cylinder head bolts and tighten by hand.
- Tighten the cylinder head in four stages in the indicated tightening sequence:

Stage	Apply
I	– Tighten with the torque wrench to 40 Nm.
II	– Tighten with the torque wrench to 60 Nm.
III	– Using a rigid wrench torque a further 90° (1/4 turn).
IV	– Using a rigid wrench torque a further 90° (1/4 turn).

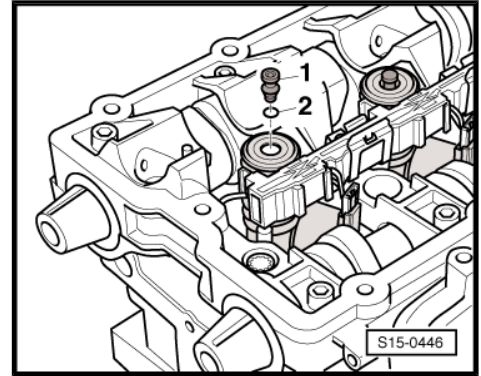


Note

Tightening up the cylinder head bolts after doing repair work is not necessary.

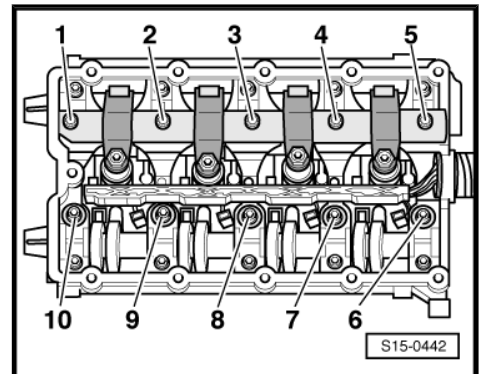
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- Before inserting the valve-lever shaft, check that all ball studs -1- and O-rings -2- have been inserted in the unit injectors.

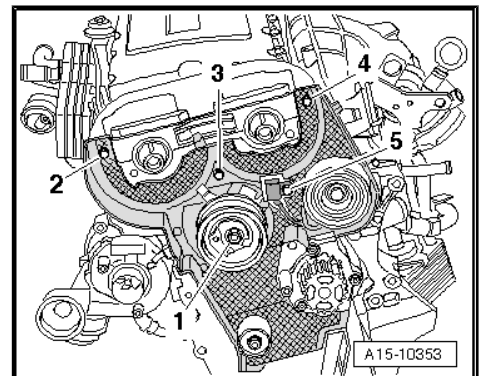


- Screw in the valve-lever shaft and bearing frame as follows:
- Replace screws -1 ... 5-.

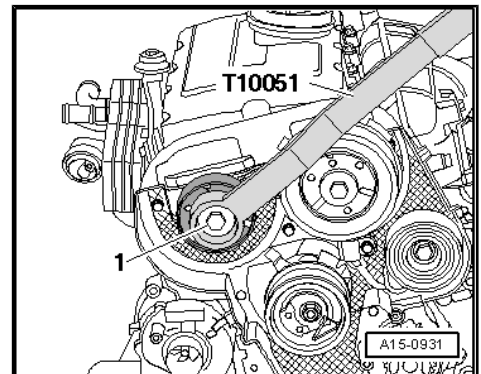
Se- quence	Apply
I	– Alternately tighten screws -2- and -4- in stages until the valve-lever shaft is resting on the bearing frame.
II	– Tighten screws -1-, -3- and -5- to 20 Nm + torque a further 90° (1/4 turn).
III	– Tighten screws -2- and -4- to 20 Nm + torque a further 90° (1/4 turn).
IV	– Tighten bearing frame screws -6...10- to 20 Nm.



- Moisten screws -2 ... 5- with sealant - D 000 600 A2- and insert and tighten to 10 Nm.
- Fit the nut -1- of the toothed belt tensioning pulley onto the pin screw.

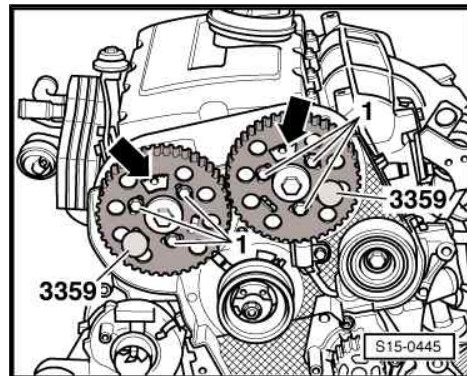


- Place hub on exhaust camshaft.
- Tighten screw -1- to 100 Nm, use counterholder - T10051- to hold.
- Place the hub onto the intake camshaft in the same way and tighten the hub.

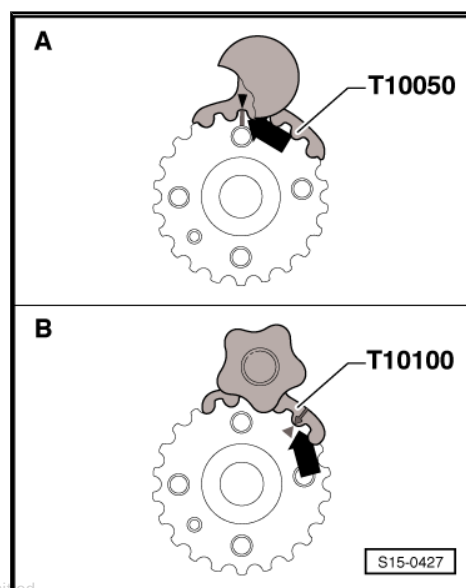
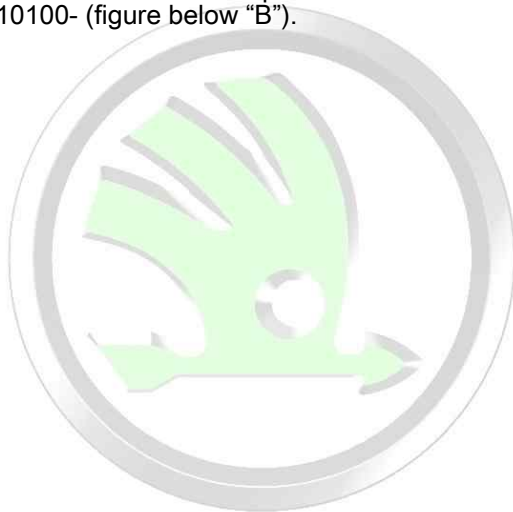




- Push camshaft sprockets onto the hubs
- The two tooth segments -arrows- on the toothed belt sprockets.
- Slightly screw in plug -1-.
- Camshaft sprockets must still turn on the hubs, but must not tilt.
- Lock hubs using rig pins - 3359- .
- Rotate crankshaft to TDC for cylinder 1.



- Lock the crankshaft toothed belt sprocket with the crankshaft arrester - T10100- (figure below "B").



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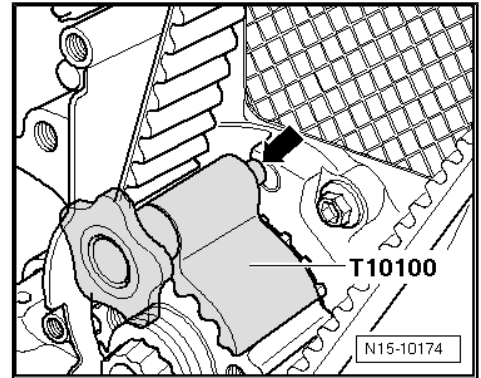
Note

- ◆ *Markings on the toothed belt sprocket and on the crankshaft arrester must be in line with each other -arrow-.*
- ◆ *The pin on the crankshaft arrester -arrow- must engage into the hole in the sealing flange.*
- ◆ *The crankshaft arrester can only be fitted onto the toothed belt sprocket from the front side of the serration.*

- Install toothed belt (set and check timings) ⇒ [page 23](#) .
- Install cylinder head cover ⇒ [page 55](#) .

Further installation occurs in reverse order to removal. Pay attention to the following:

- Always replace gasket rings and seals.
- Install diesel particle filter ⇒ [page 154](#) .
- Checking the oil level ⇒ Maintenance ; Booklet Octavia II .



Note

Change contaminated engine oil ⇒ Maintenance ; Booklet Octavia II .

- Top up or replace coolant ⇒ [page 96](#) .

1.4 Checking compression

The compression pressure is tested using a guided "fault-finding program" of the vehicle diagnosis, measurement and information system - VAS 5051- , under "Repair Group 15; Cylinder head/ valve gear; Particular System, Boundary Conditions; Diagnostic Object: Poor compression pressure".



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2 Repairing Valve Gear

2.1 Summary of components



Note

- ◆ After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise the valves would strike the pistons).
- ◆ After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.
- ◆ Always replace gasket rings and seals.
- ◆ Removing and installing the tandem pump ➔ [page 113](#).

1 - Holder for cable strip - 10 Nm

2 - 20 Nm

- ☐ Pay attention to sequence for loosening and tightening
➔ [page 71](#)

3 - Valve-lever shaft

- ☐ for unit injector

4 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ Pay attention to sequence for loosening and tightening
➔ [page 71](#)

5 - Cylinder head screw

- ☐ replace
- ☐ Pay attention to sequence for loosening and tightening
➔ [page 63](#)

6 - Washer

- ☐ for cylinder head screws
- ☐ before installing the bearing frame, insert into the cylinder head

7 - Valve collets

8 - Valve spring plate

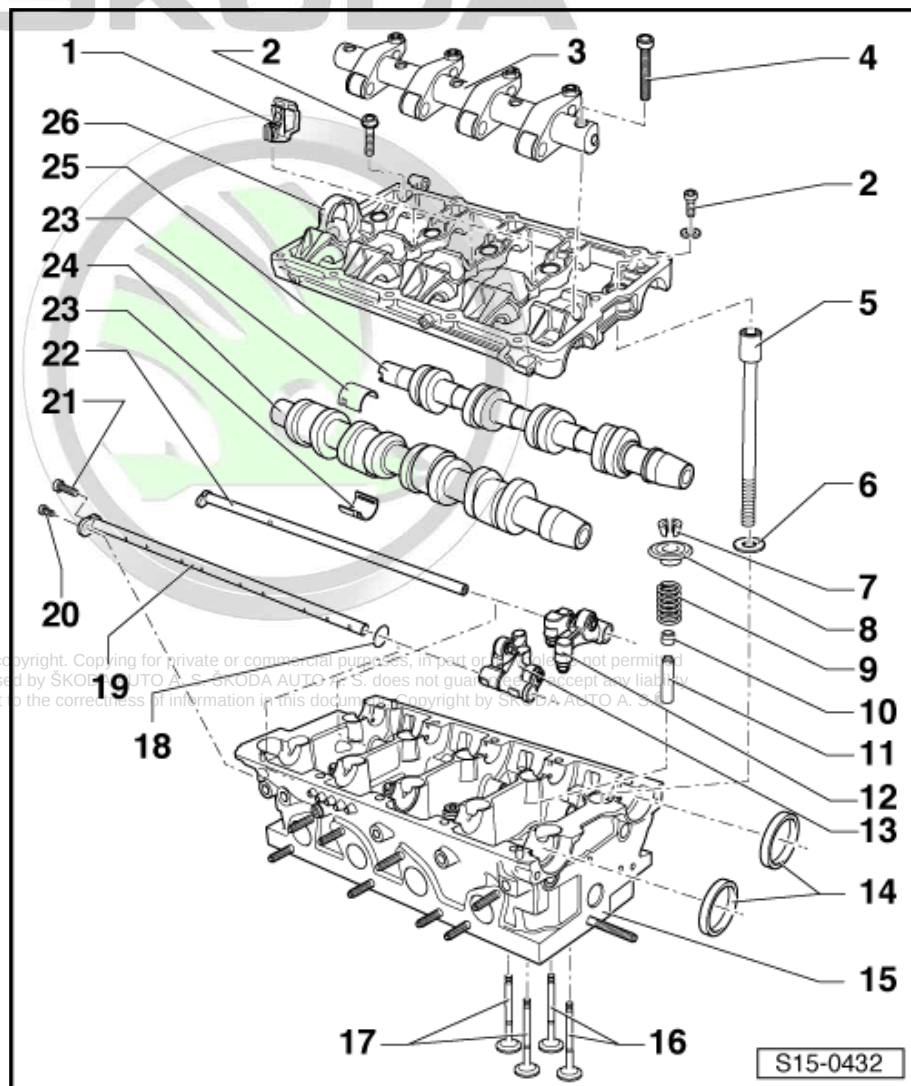
9 - Valve spring

10 - Valve stem gasket

- ☐ Replace ➔ [page 80](#)

11 - Valve guide

- ☐ not to be replaced



- ☐ Check ⇒ [page 83](#)

12 - Valve lever for inlet valve

- ☐ do not mix up used valve levers (mark)
- ☐ with hydraulic valve clearance compensation; check ⇒ [page 79](#)
- ☐ Check roller bearings for easy running and play
- ☐ Removing and installing ⇒ [page 77](#)

13 - Valve lever for outlet valve

- ☐ do not mix up used valve levers (mark)
- ☐ with pressed-in hydraulic balancing element; check ⇒ [page 79](#)
- ☐ Check roller bearings for easy running and play
- ☐ Removing and installing ⇒ [page 77](#)

14 - Sealing rings

- ☐ Do not oil or grease the sealing lips
- ☐ Remove oil from camshaft pin before installation
- ☐ Before installation, cover up the groove for spring on camshaft cone with suitable adhesive tape
- ☐ Removing and installing ⇒ [page 70](#)

15 - Cylinder head

- ☐ Removing and installing ⇒ [page 56](#)
- ☐ Valve seats must not be reworked.

16 - Inlet valves

- ☐ Valve dimensions ⇒ [page 83](#)

17 - Outlet valves

- ☐ Valve dimensions ⇒ [page 83](#)

18 - O-ring

- ☐ replace

19 - Valve lever pin for outlet valves

- ☐ Outlet side
- ☐ Removing and installing ⇒ [page 77](#)

20 - 10 Nm

21 - Screw plug - 10 Nm

- ☐ replace

22 - Valve lever pin for inlet valves

- ☐ Inlet side
- ☐ Removing and installing ⇒ [page 77](#)

23 - Bearing shell

- ☐ do not mix up used bearing shells (mark)
- ☐ Check that the retaining lugs are correctly located in the bearing frame and in the cylinder head

24 - Exhaust camshaft

- ☐ Inspecting axial play ⇒ [page 70](#)
- ☐ Removing and installing ⇒ [page 71](#)

25 - Inlet camshaft

- ☐ Inspecting axial play ⇒ [page 70](#)
- ☐ Removing and installing ⇒ [page 71](#)

26 - Bearing frame

- ☐ Pay attention to sequence for loosening and tightening ⇒ [page 71](#)
- ☐ install with silicone sealant - D 176 501 A1-

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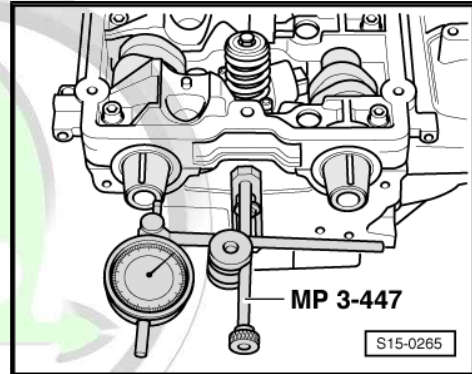
2.2 Checking the axial play of the camshafts

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Dial gauge

Test sequence

- Carry out measurement with removed valve levers and installed bearing frame.
- Wear limit: 0,15 mm



2.3 Replacing camshaft gasket rings

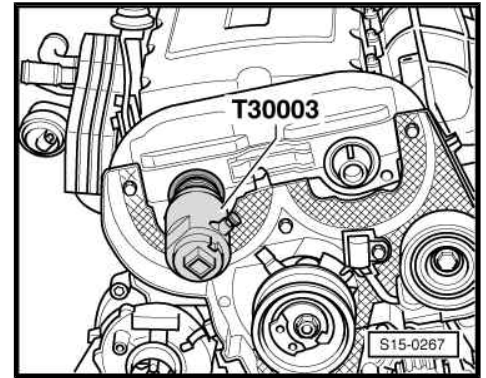
Special tools and workshop equipment required

- ◆ Insertion tool - MP 1-214 (10-203)-
- ◆ Sealing ring extractor - T30003 (3240)-
- ◆ Counterholder - T10051 -
- ◆ Extractor - T10052-
- ◆ Screw M12 x 1.5 x 65 or screw M12 x 1.5 x 75 with insertion tool - MP 1-214 (10-203)- with spacer 10 mm

Removing

- Cylinder head fitted.
- Remove toothed belt ⇒ [page 23](#) .
- Remove camshaft sprockets and remove hubs ⇒ [page 24](#) .

- Position the inner part of the sealing ring extractor - T30003- so that it is flush with the outer part, and lock with the knurled screw.
- Oil the thread head of the gasket ring extractor, position and forcibly screw as far as possible into the sealing ring of the exhaust camshaft.
- Release knurled screw and turn the inner side against the camshaft until the gasket ring is pulled out.
- Clamp gasket ring extractor into the vice and remove gasket ring with pliers.
- Clean the contact and sealing surfaces.
- Remove the sealing ring of the intake camshaft in the same way.



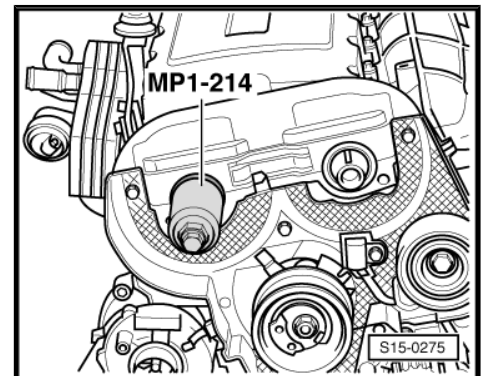
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



The sealing lips of the sealing rings must not be additionally oiled or greased.

- Use a clean cloth to remove oil residues on the camshaft pins.
- Cover up the groove on the exhaust camshaft cone with adhesive tape and carefully push the sealing ring onto the camshaft.
- Press in the seal up to the stop, using insertion tool - MP 1-214- and screw M12 x 1.5 x 65 (or using screw M12 x 1.5 x 75 from the insertion tool - MP 1-214- with 10 mm spacer).
- Install the sealing ring of the intake camshaft in the same way.
- Install hub and camshaft sprockets ➔ [page 24](#) .
- install (set the timing) ➔ [page 23](#) .



2.4 Removing and installing camshafts

Special tools and workshop equipment required

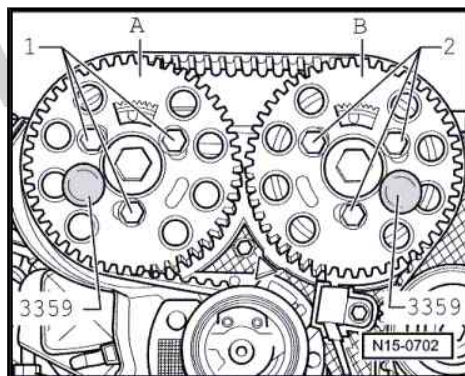
- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Counterholder - T10051-
- ◆ Extractor - T10052-
- ◆ Extractor - T10312-
- ◆ locking pin - 3359- or locking pin - MP 1-301-
- ◆ Surround - T10262-
- ◆ Dial gauge
- ◆ Silicone sealant - D 176 501 A1-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.



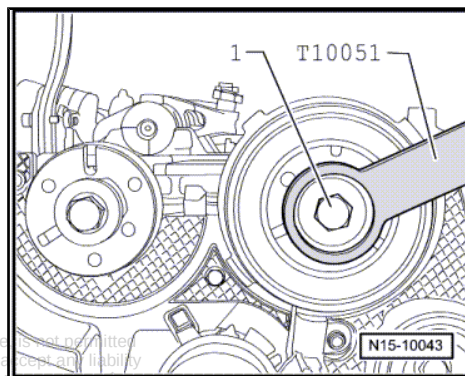
- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-
- ◆ Protective goggles
- ◆ Protective gloves

Removing

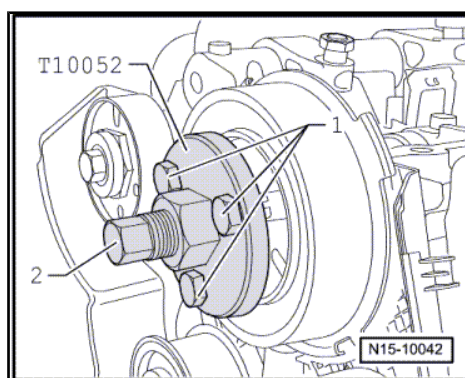
- Cylinder head fitted.
- Remove toothed belt off camshaft sprockets ⇒ [page 23](#) .
- Remove locking pins for diesel injection pump - 3359- .
- Unscrew screws -1- and -2- of the camshaft sprockets.
- Remove toothed belt sprockets from the hubs.



- Loosen fixing screw -1- of the hub. Use counterholder - T10051- for this purpose.
- Unscrew the fixing screw of the hub by approx. 2 turns.



- Position the extractor - T10052- and align it with the hub bores.
- Tighten fixing screws -1-.
- Put the hub under tension by uniformly tightening the screw -2- until the hub is released from the camshaft cone.



Note

When doing so, counterhold the hexagon on the extractor using the SW 30 wrench.

- Remove hub from cone of camshaft.
- When doing so, counterhold the hexagon on the extractor using the SW 30 wrench.
- Remove cylinder head cover ⇒ [page 55](#) .
- Remove tandem pump ⇒ [page 113](#) .



Note

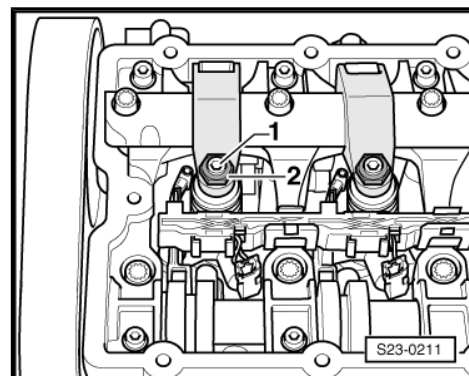
The hoses can remain connected to the tandem pump.

- Undo the locknuts -2- of the adjusting screws -1- for all unit injectors and unscrew adjusting screws until the respective valve lever is resting on the tappet spring of the unit injector.

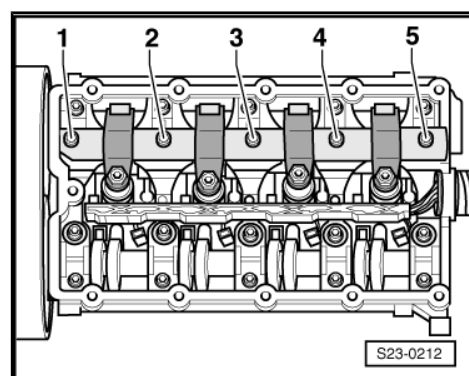


Note

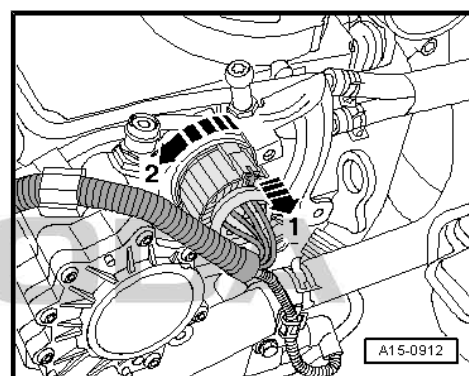
Do not remove the screws from the valve lever shaft in order that the individual parts remain attached to the valve lever shaft. Mark the assignment of the valve lever if necessary.



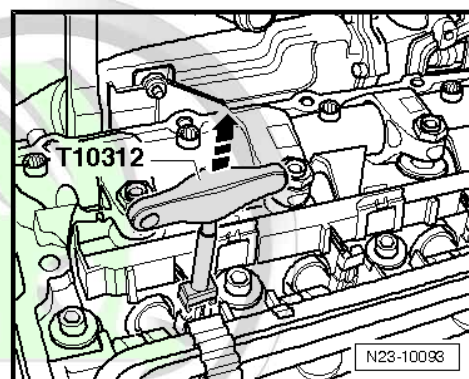
- Remove screws -1-, -3- and -5-.
- Undo screws -2- and -4- and alternately remove in several stages. Then remove the valve-lever shaft with valve levers.



- Pull the release mandrel in -arrow direction 1- and open the knurled nut in -arrow direction 2-.
- Disconnect the central plug connection for unit injectors and ceramic glow plugs and uncover the wiring harness.



- Slide the extractor - T10312- laterally onto the connectors of the unit injectors and remove in the -direction of the arrow-.





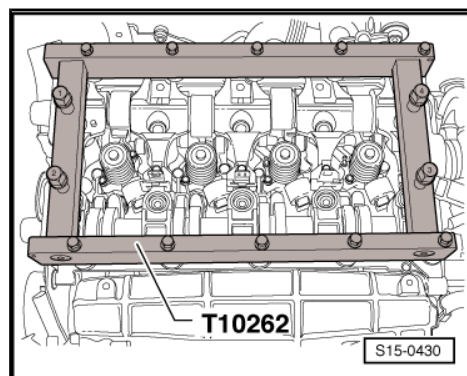
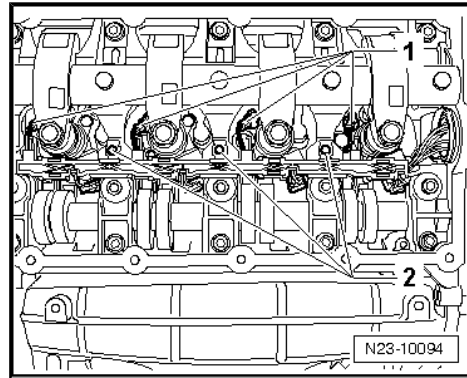
- Unplug connector -1- from the ceramic glow plugs.



Caution

The installation / removal of the wiring harness must only be carried out by unscrewing/screwing on the clamps. By removing the cable guide from the clamps, the clamps will be bent apart and the larger clearance can lead to cable breakage.

- Fixing screws -2-, unscrew the stainless steel clamps (10 Nm) and place the wiring harness down.
- Unscrew the top fixing screws on the rear toothed belt guard.
- Evenly loosen and remove the remaining 15 screws of the bearing frame from outside to inside.
- Remove jacking screws SW 15 of the frame -T10262- by turning anti-clockwise to the stop.
- Place frame -T10262- on the bearing frame as shown and tighten fixing screws SW 10 to 10 Nm.
- Screw in the jacking screws by hand until they touch the cylinder head bolts.
- Evenly screw in the jacking screws in the sequence -1...4- shown on the screw heads until the bearing frame has detached from the cylinder head.
- Remove bearing frame.



Note

- ◆ *Ensure that the bearing shells of the camshaft are not mixed up.*
- ◆ *Mark assignment of the camshaft bearing shells with water-proof marker on the reverse side.*
- Take out camshafts.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

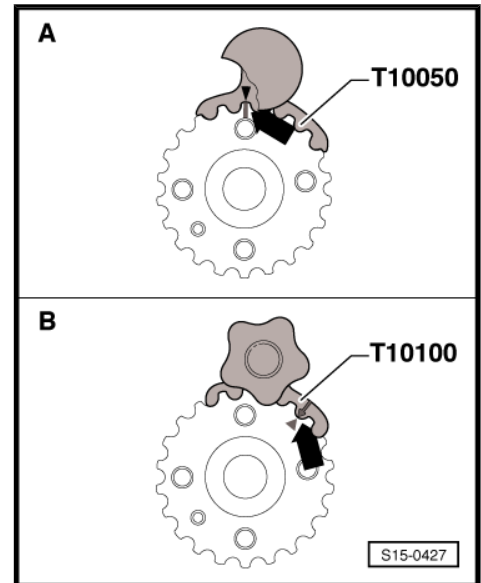


WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

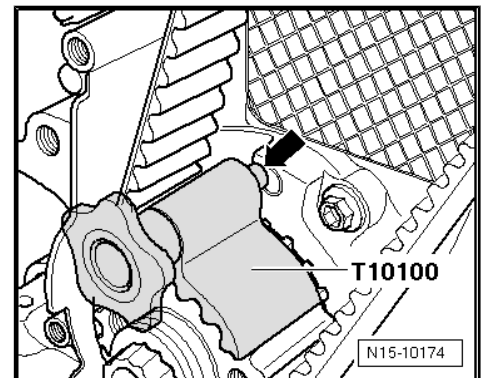
- Remove residual sealant on the bearing frame and cylinder head using a chemical sealant remover.
- Clean sealing surfaces, they must be free of oil and grease.

- Check if the crankshaft is on TDC for cylinder 1.
- Lock the crankshaft toothed belt sprocket with the crankshaft arrester - T10100- lock (figure below “B”) on TDC for Cyl. 1.

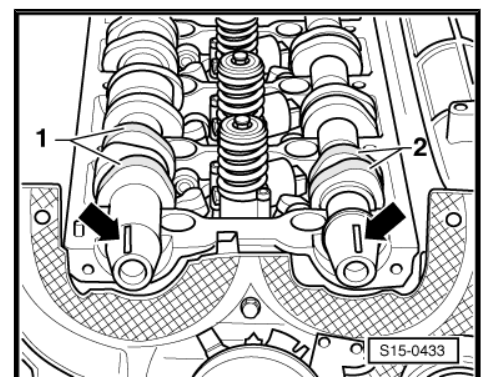


Note

- ◆ *Markings on the toothed belt sprocket and on the crankshaft arrester must be in line with each other -arrow-.*
- ◆ *The pin on the crankshaft arrester -arrow- must engage into the hole in the sealing flange.*
- ◆ *The crankshaft arrester can only be fitted onto the toothed belt sprocket from the front side of the serration.*
- ◆ *Ensure that the used camshaft bearing shells are not mixed up (pay attention to marking).*
- ◆ *When installing the camshafts, make sure that the bearing shell retaining lugs are correctly positioned in the bearing frame and cylinder head.*



- Lubricate the running surfaces of the camshafts and bearing shells.
- Camshafts in TDC position for cylinder 1:
- The cams -1- and -2- for cylinder 1 must be pointing upwards on both camshafts.
- The grooves -arrows- in the camshafts must also point upwards.



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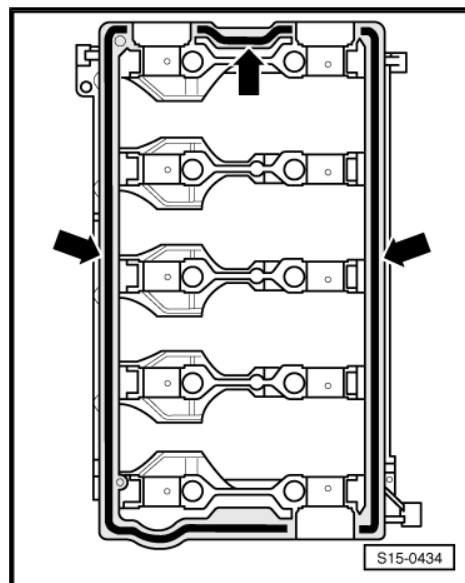
- Cut the nozzle tube at the front marking ($\varnothing$ of the nozzle approx. 2 mm) and apply silicone sealant - D 176 501 A1- to the clean sealing surface of the bearing frame -arrows-.
- Thickness of sealant bead: 2 mm.



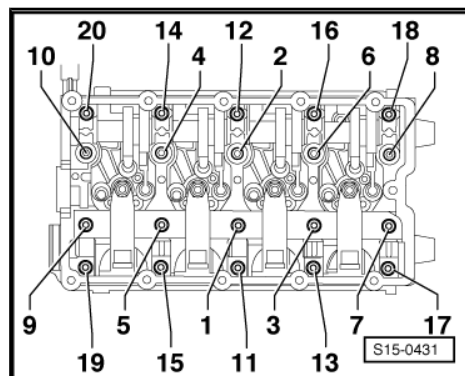
Note

The bearing frame must be installed within 5 minutes after applying the silicone sealant.

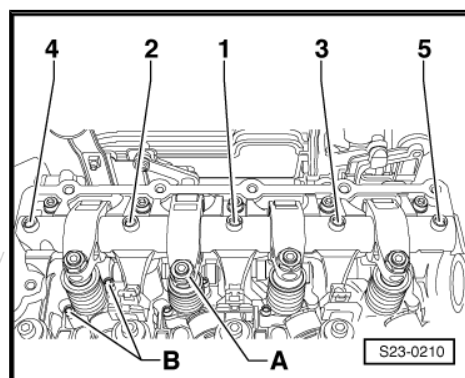
- Place bearing frame with inserted bearing shells onto the dowel pins of the cylinder head.



- Replace screws -1, 3, 5, 7, 9-.
 - Tighten screws -1 ... 20- evenly and in the specified order from inside to outside.
- Tightening torque: 20 Nm.
- Insert valve-lever shaft.



- Continue turning in valve-lever shaft screws -1 ... 5- by 90° in the specified order (1/4 turn).
- Insert the cable strip into the holders, and connect the plug of the unit injector, the plug of the ceramic glow plugs and the central plug connection for the unit injector and for the ceramic glow plugs.



- Install camshaft sealing rings ➔ [page 70](#).
- Install tandem pump ➔ [page 113](#).
- Install hub and camshaft sprockets ➔ [page 24](#).
- install toothed belt and set the timing ➔ [page 23](#).

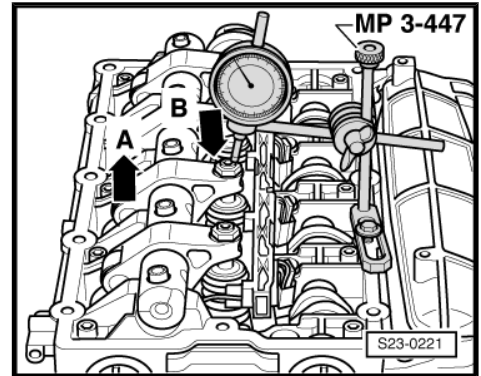
- Place a dial gauge on the adjusting screw of the unit injector.



Caution

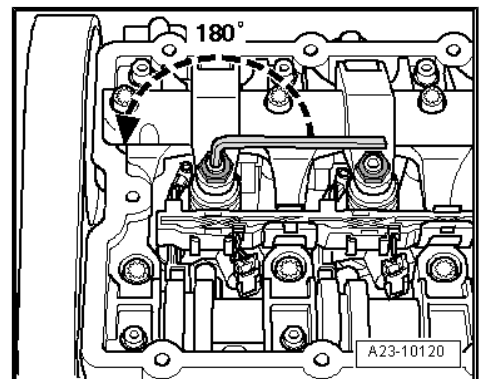
The engine may only be turned in the direction of engine rotation (clockwise) at the crankshaft.

- Turn the crankshaft in the running direction of the engine until the roller of the valve lever is on the drive cam tip.
- Valve lever roller side -arrow A- is at the highest point.
- Dial gauge -arrow B- is at the lowest point.
- Remove the dial gauge.
- Turn the adjusting screw into the valve lever until clear resistance can be felt (the unit injector is at the stop).
- Turn the adjusting screw in the opposite direction from the stop by about 180°
- Firmly hold the adjusting screw in this position and tighten the locknut to 30 Nm.
- Install cylinder head cover ➔ [page 55](#) .



Note

- ◆ After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise the valves would strike the pistons).
- ◆ After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.



2.5 Removing and installing valve levers

Special tools and workshop equipment required

- ◆ Extractor - T10133/3-



Note

- ◆ Replace O-rings.
- ◆ Do not mix up the old valve levers

Remove valve levers for outlet valves

- Remove battery and battery tray ➔ [Electrical System](#) ➔ [Repair](#).
- Remove the camshafts ➔ [page 71](#) .
- Drain coolant ➔ [page 96](#) .
- Remove connection pipe for exhaust gas recirculation between mechanical exhaust gas recirculation valve and exhaust gas recirculation cooler ➔ [page 161](#) .
- Remove the connecting piece for coolant from the cylinder head ➔ [page 93](#) .

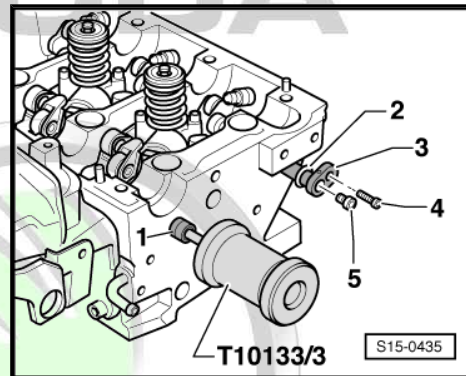


- When installing again, mark the assignment of the valve lever and the valve lever pin.
- Remove screws -4- and -5-.
- Extract pin -3- on the outlet side of the valve levers using extractor - T10133/3- so that it is removed from the cylinder head, and remove valve lever.



Caution

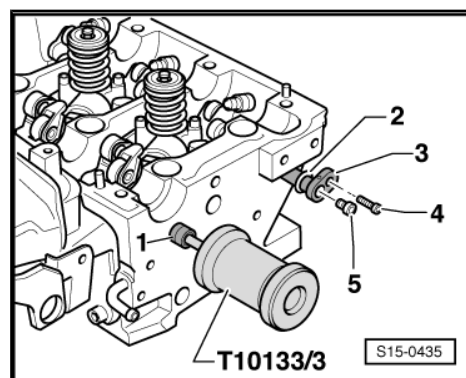
When loosening the screw plug -5-, the valve lever pin on the outlet side may twist against the mounting plate. If a deformation is noticeable during the visual inspection of the thread in the valve lever pin, this pin must not be used any more because the oil openings for the valve lever will no longer match. This may cause seizure.



Install valve levers for outlet valves

Installation occurs in reverse order to removal. Pay attention to the following:

- Before installing, wet the valve lever bearings with clean engine oil.
- Slide new O-ring onto the valve lever pin.
- Insert the valve lever pin into the cylinder head and insert the valve levers one after the other.
- Tighten fixing screw -4- to 10 Nm.
- Replace screw plug -5- and tighten the new one to 10 Nm.
- Install connecting piece for coolant to the cylinder head
⇒ [page 93](#) .
- Fit the connection pipe for exhaust gas recirculation between mechanical exhaust gas recirculation valve and exhaust gas recirculation cooler ⇒ [page 161](#) .
- Install camshafts ⇒ [page 71](#) .
- Install battery ⇒ Electrical System ⇒ Rep. gr. 27 .
- Top up coolant ⇒ [page 96](#) .



Remove valve levers for inlet valves

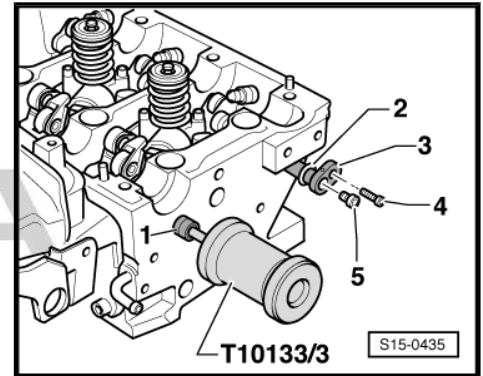
- Remove battery and battery tray ⇒ Electrical System ⇒ Rep. gr. 27 .
- Remove the camshafts ⇒ [page 71](#) .
- Mark assignment of valve levers to aid reinstallation

- Extract the pin on the inlet side of the valve levers using extractor - T10133/3- so that they are removed from the cylinder head, and remove valve levers.

Install valve levers for inlet valves

Installation occurs in reverse order to removal. Pay attention to the following:

- Before installing, wet the valve lever bearings with clean engine oil.
- Insert the valve lever pin into the cylinder head and insert the valve levers one after the other.
- The valve lever pin must be flush with the cylinder head.
- Install camshafts ➔ [page 71](#) .
- Install battery ➔ Electrical System ➔ Rep. gr. 27 .



2.6 Checking hydraulic balancing elements

Special tools and workshop equipment required

- ♦ Feeler gauges



Note

- ♦ *The hydraulic balancing elements pressed into the valve levers cannot be repaired.*
- ♦ *Irregular valve noises when starting engine are normal.*

Test sequence

- Start engine and allow to run until the radiator fan starts. Increase engine speed to about 2500 rpm for 2 minutes and undertake a test drive if necessary.



Note

If there are irregular valve noises which disappear after a long drive but keep reappearing on short journeys then the return-flow check tube is defective. Fitting location: in the oil filter holder ➔ [page 84](#) . The return-flow check tube cannot be replaced individually.

If the valves are still making loud noises, determine the defective hydraulic balancing element as follows:

- Remove cylinder head cover ➔ [page 55](#) .
- Turn the crankshaft until the cam of the hydraulic balancing element to be tested is at the top; to do so, push the vehicle forward in 4th gear with the ignition switched off.



- Press the valve lever downwards using a screwdriver -arrow- and measure the clearance between the cam and roller of the valve lever.

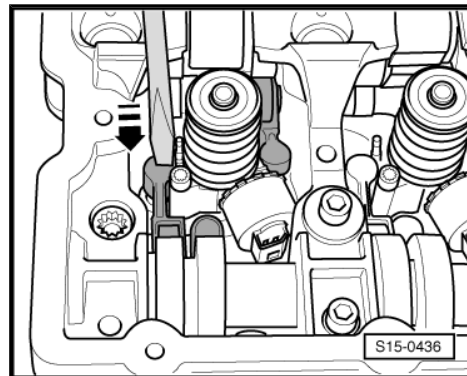
If a 0.20 mm feeler gauge can be fitted between the cam and the valve lever roller:

- Replace valve lever with hydraulic valve clearance compensation; to do so, remove valve lever ➔ [page 71](#) .



Note

- ◆ *After installing the camshafts, the engine must not be started for about 30 minutes. The valve lever with hydraulic valve clearance compensation must settle (otherwise the valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*



2.7 Replacing valve stem seals

- Cylinder head fitted

Special tools and workshop equipment required

- ◆ Extractor - MP 1-230 (3364)-
- ◆ valve stem seal insertion tool - MP 1-233 (3365)-
- ◆ Disassembly and assembly device for valve collets - VAS 5161-
- ◆ Guide plate for 2.0 TDI engine - VAS 5161/21-



Note

- ◆ *With cylinder head removed:*
- ◆ *Remove ceramic glow plugs from the cylinder head ➔ [page 166](#) .*
- ◆ *Remove unit injectors from the cylinder head ➔ [page 141](#) .*
- ◆ *Position cylinder head on a suitable flat valve supporting plate.*

Removing

- Remove the camshafts ➔ [page 71](#) .

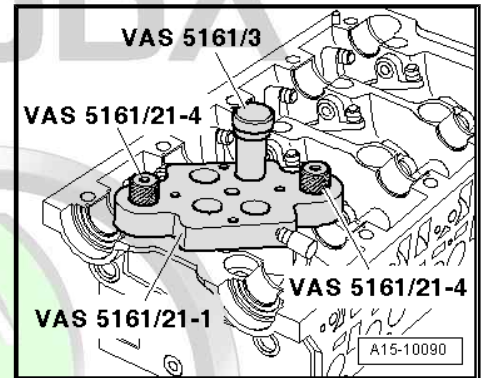
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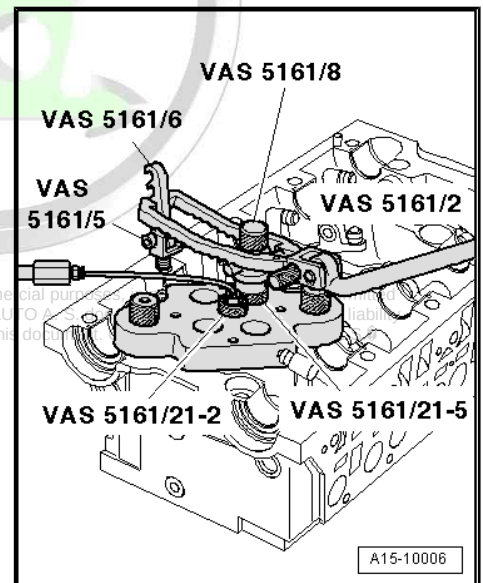
Note

- ◆ *Ensure that the bearing shells of the camshaft are not mixed up.*
- ◆ *Mark assignment of the camshaft bearing shells with water-proof marker on the reverse side.*
- Remove camshaft bearing shells from the cylinder head.
- Remove the unit injectors ➔ [page 141](#) .

- Put the piston of the relevant cylinder at “bottom dead centre”.
- Position the guide plate - VAS 5161/21-1- onto the cylinder head.
- Attach the guide plate - VAS 5161/21-1- with the knurled screws - VAS 5161/21-4- .
- Insert the impact mandrel - VAS 5161/3- into the guide plate and knock off the tightly fitted valve collets using a plastic hammer.

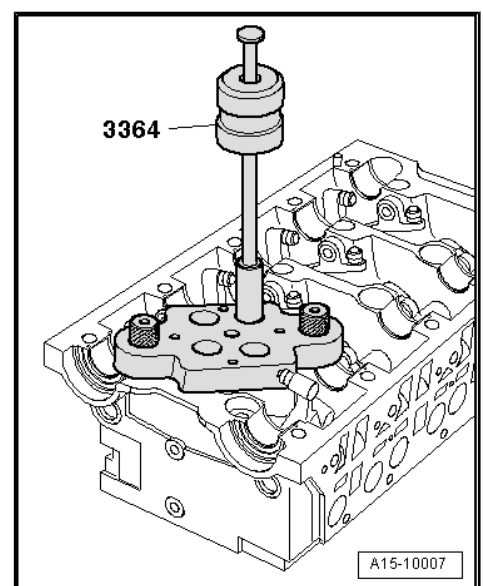


- Screw the adapter - VAS 5161/21-2- into the guide plate by hand.
- Attach the detent part - VAS 5161/6- to the cylinder head using the support fork - VAS 5161/5- .
- Push the spacer - VAS 5161/21-5- onto the assembly cartridge - VAS 5161/8- .
- Insert the assembly cartridge - VAS 5161/8- into the guide plate - VAS 5161/21-1- .

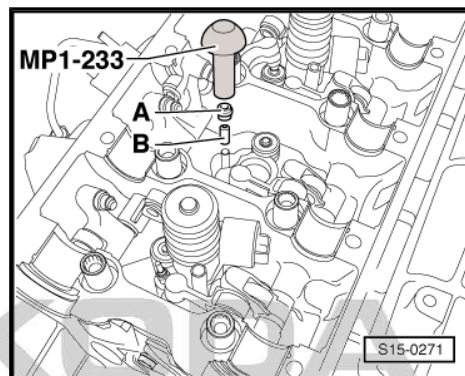


- Connect the adapter - VAS 5161/21-2- to the compressed air with a commercially available intermediate piece and apply constant pressure.
- Minimum pressure: 0.6 MPa (6 bar) overpressure.
- Hook the pressure fork - VAS 5161/2- into the detent part - VAS 5161/6- .
- Press the assembly cartridge - VAS 5161/8- down while simultaneously turning the knurled screw on the assembly cartridge to the right until the nibs engage into the valve collets.
- Slightly move back and forward the knurled screw. This pushes the valve collets apart and into the assembly cartridge.
- Release the pressure fork - VAS 5161/2- .
- Remove the assembly cartridge - VAS 5161/8- with spacer - VAS 5161/21-5- , valve spring plate and valve spring.
- Pull off valve stem seals with the extractor - 3364- .

Installing



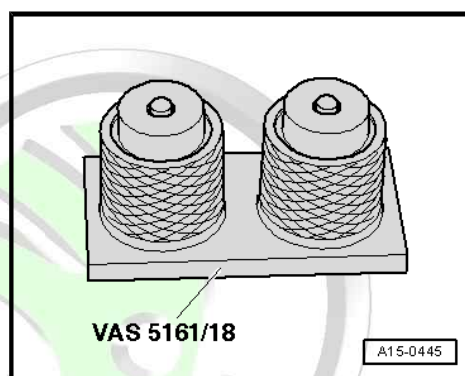
- Place the supplied plastic sleeve -B- on the respective valve stem. This will prevent any damage to the new valve stem seal -A-.
- Insert the new valve stem seal into the insertion tool - MP 1-233- .
- Oil the sealing lip of the valve stem seal and carefully slide onto the plastic sleeve -B-.
- Carefully press the valve stem seal with the valve stem seal insertion tool - MP 1-233- onto the valve guide.
- Remove the plastic sleeve -B- again.
- Insert the valve spring and the valve spring retainer.
- If the valve collets were removed from the assembly cartridge - VAS 5161/8- , they must first be inserted into the insertion device for valve collets -VAS 5161/18- .



Note

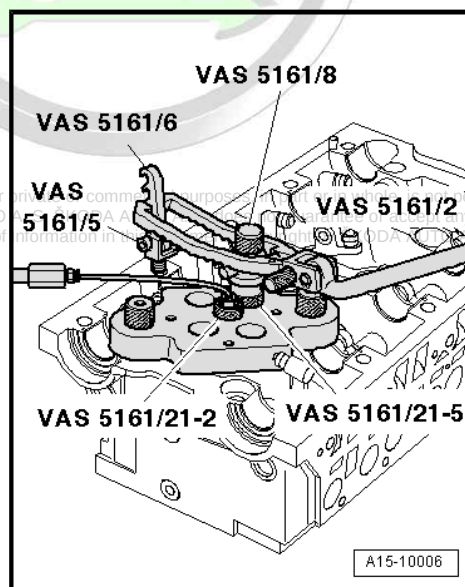
The large diameter of the valve collets points to the top.

- Press the assembly cartridge onto the insertion device - VAS 5161/18- from above and lift up the valve collets.
- Insert the assembly cartridge - VAS 5161/8- into the guide plate.
- Push the pressure fork - VAS 5161/2- down and turn the knurled screw on the assembly cartridge to and fro thereby pulling it upwards. This inserts the valve collets.
- Release the pressure fork - VAS 5161/2- on tightened knurled screw.



The valve stem seal is removed and installed on the other valves in the same way.

- Install the unit injectors ➤ [page 141](#) .
- Install camshafts ➤ [page 71](#) .



Note

- ◆ *After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The valve lever with hydraulic valve clearance compensation must settle (otherwise the valves would strike the pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*

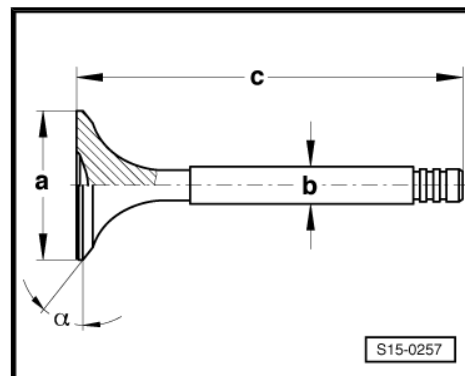
2.8 Valve dimensions

Dimension		Inlet valve	Exhaust valve
Ø a	mm	29.20	25.50
Ø b	mm	5.975	5.965
c	mm	87.80	87.50
α	°	45	45



Note

Valves must not be reworked. Only lapping-in is permitted.



2.9 inspecting valve guides

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Dial gauge

Test sequence



Note

If the valves are replaced when carrying out repair work, use new valves for the measurement.

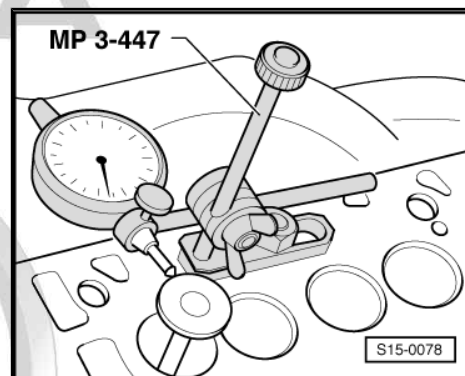
- Insert valve into valve guide. End of valve stem must be flush with guide.

Valve rock: max. 1.3 mm



Note

If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceeded, replace cylinder head. The valve guides cannot be changed.





17 – Lubrication

1 Removing and installing parts of the lubrication system



Note

- ◆ If the engine is damaged and there is a suspicion that this damage was caused due to a mixture of oil with fuel (engine odour test), then it is essential to check whether the tandem pump is sealed on the inside ➔ [page 116](#) ,
- ◆ If considerable quantities of metal swarf as well as abrasion is found in the engine oil when carrying out engine repairs, carefully clean the oil galleries in order to avoid consequential damage and additionally replace the engine oil cooler as well as the oil filter element.
- ◆ The oil level must not be above the Max. marking on the oil dipstick - risk of damage to catalytic converter!

Check the engine oil, amount of oil and oil specification ➔ Maintenance ; Booklet Octavia II .

1 - 15 Nm

2 - Drive chain sprocket

- ☐ for oil pump
- ☐ Removing and installing
➔ [page 46](#)

3 - Dipstick

- ☐ Oil level must not exceed the max. marking

4 - Hopper

- ☐ Remove for extracting oil

5 - Guide tube

6 - Oil spray jet

- ☐ for cooling pistons
- ☐ Pay attention to part number (right-angle bend)

7 - Pressure relief valve, 27 Nm

- ☐ opens at an overpressure of 0.25 to 0.32 MPa (2.5 to 3.2 bar)
- ☐ replace without sealant

8 - O-ring

- ☐ replace

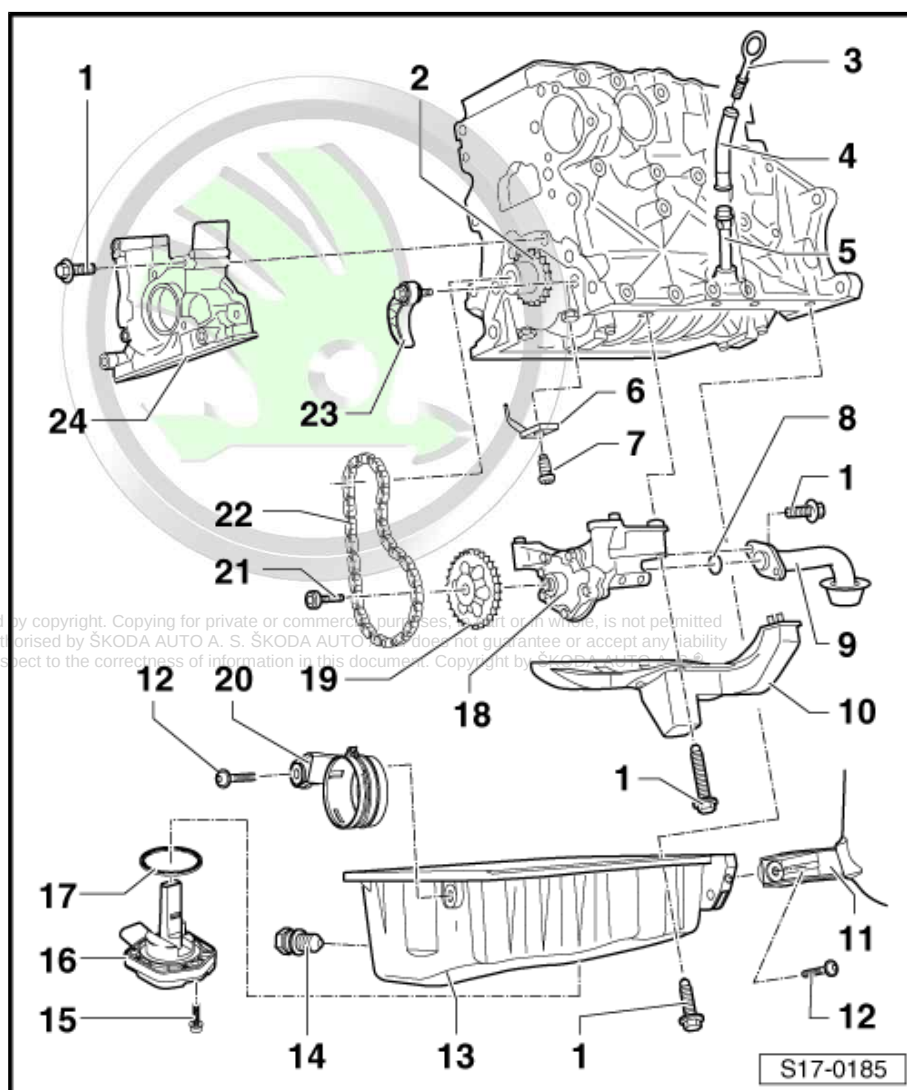
9 - Intake manifold

- ☐ Clean strainer if dirty

10 - Baffle

11 - Charge air pipe

- ☐ on the inlet side



⇒ [page 128](#)

12 - 8 Nm

13 - Oil pan

- ☐ Removing and installing ⇒ [page 87](#)
- ☐ install with silicone sealant - D 176 600 A1-

14 - Drain plug, 30 Nm

- ☐ with sealing ring
- ☐ replace

15 - 10 Nm

- ☐ replace

16 - Oil level and oil temperature sender - G266-

- ☐ Check ⇒ Vehicle diagnostic tester

17 - O-ring

- ☐ replace

18 - Oil pump

- ☐ with pressure relief valve 1,2 MPa (12 bar)
- ☐ Removing and installing ⇒ [page 89](#)
- ☐ before installing, check whether both dowel sleeves are present
- ☐ if there is any scoring on the contact surfaces of the gears, replace
- ☐ Tightening torque of oil pump cover at oil pump housing: 10 Nm

19 - Oil pump sprocket

- ☐ Fits onto oil pump shaft in one position only

20 - Charge air pipe

- ☐ on the exhaust side ⇒ [page 128](#)

21 - 20 Nm + torque a further 90° (1/4 turn)

- ☐ replace

22 - Oil pump chain

- ☐ before removing mark running direction
- ☐ check for wear

23 - Chain tensioner

- ☐ do not disassemble
- ☐ Replace chain tensioner if spring is broken
- ☐ Check fitting position
- ☐ When installing, hook on the spring and pretension
- ☐ tighten to 16 Nm

24 - Sealing flange - belt pulley side

- ☐ must be positioned on dowel sleeves
- ☐ Removing and installing ⇒ [page 35](#)
- ☐ Replace crankshaft sealing ring (on belt pulley side) ⇒ [page 34](#)

1.1 Disassembling and assembling the oil filter holder

1 - Screw plug - 25 Nm

2 - Gasket

- ☐ replace

3 - Engine oil cooler

- ☐ Pay attention to the information regarding a necessary replacement.
- ☐ Connection diagram for coolant hoses
⇒ [page 95](#)

4 - Gasket

- ☐ replace
- ☐ Fitting position
⇒ [page 87](#)

5 - 15 Nm + torque a further 90° (1/4 turn)

- ☐ replace
- ☐ tighten crosswise

6 - Oil filter holder

- ☐ with return-flow check tube
- ☐ Oil return-flow check tube cannot be replaced individually

7 - Sealing ring

- ☐ replace

8 - Oil pressure switch - F1- - 20 Nm

- ☐ 0.07 MPa (0.7 bar) switch
- ☐ Check ⇒ [page 89](#)

9 - Screw cap - 25 Nm

- ☐ slacken and tighten with oil filter wrench - 3417-

10 - O-ring

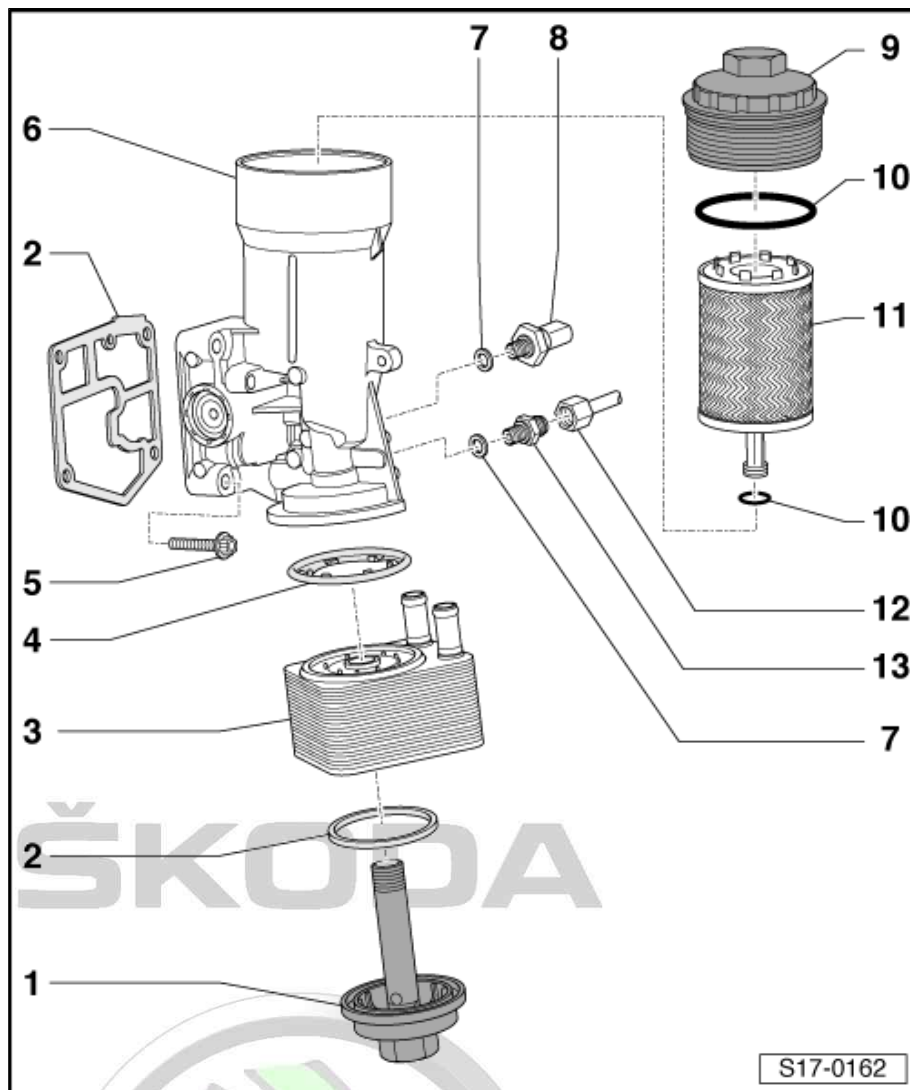
- ☐ replace

11 - Oil filter element

- ☐ pull off from screw cap (Pos. 9)
- ☐ Replace O-rings (Pos. 10) when replacing the oil filter element
- ☐ Check fitting position
- ☐ Keep to change intervals ⇒ Maintenance ; Booklet Octavia II

12 - Oil feed line

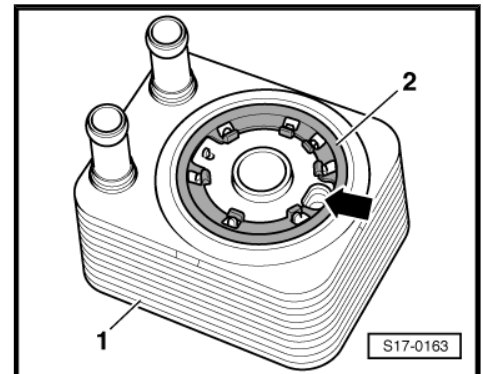
- ☐ to exhaust gas turbocharger
- ☐ Observe the mounting sequence:
 - Screw on the union nuts first of all by hand.
 - Then tighten the union nuts to 22 Nm.
 - Then secure the oil feed line in the brackets



13 - Connecting piece - 35 Nm

Fitting position of gasket for engine oil cooler

- Place the gasket -2- in such a way that it can be pressed onto all the lugs of the engine oil cooler -1-.
- The oil duct -arrow- must not be covered from the gasket.



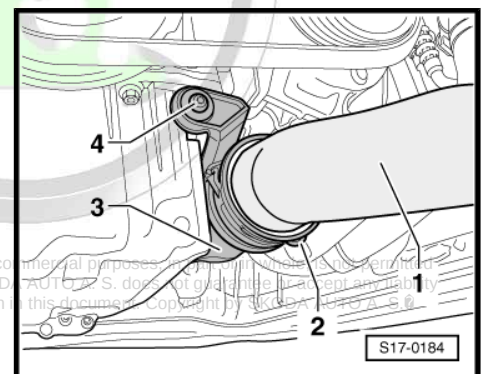
1.2 Removing and installing oil pan

Special tools and workshop equipment required

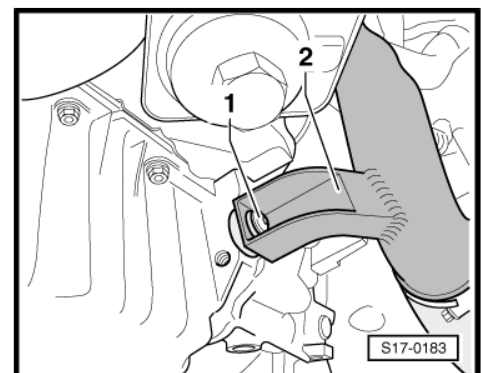
- ◆ Socket - T10058-
- ◆ Silicone sealant - D 176 600 A1-
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. -D 000 401 04-
- ◆ Protective goggles
- ◆ Protective gloves

Removing

- Remove bottom part of right wheelhouse liner ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Undo retaining clips -2- and remove the charge air hose -1-.
- Unscrew screw -4- and the screw on the cylinder block (⇒ [page 128](#)) and press off the charge air pipe -3- from the oil pan forwards.



- Unscrew screw -1- and press off the charge air pipe -2- from the oil pan to the right.
- Disconnect plug at oil level and oil temperature sender - G266- .
- Drain engine oil ⇒ Maintenance ; Booklet Octavia II .





- Unscrew the bolts of oil pan/gearbox -arrows-.
- Loosen bolts -1...20- crosswise and release.
- Remove oil pan, if necessary release by applying slight blows with a rubber-headed hammer.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:



WARNING

Wear protective gloves and goggles when working with gasket remover and degreasing agent!

- Remove residual sealant from the sealing surfaces on the cylinder block and on the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.
- Cut off nozzle tube at the front marking ($\varnothing$ of nozzle approx. 3 mm).
- Apply silicone sealant bead -arrow- to the clean sealing surface of the oil pan, as shown.
- Thickness of sealant bead: 2-3 mm



Note

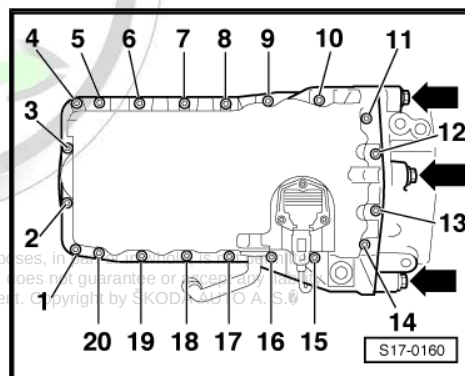
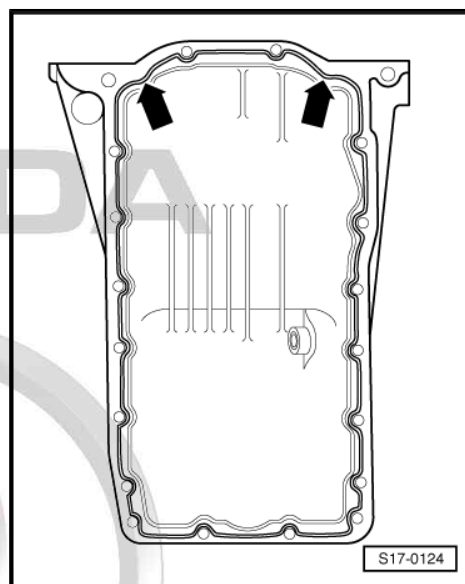
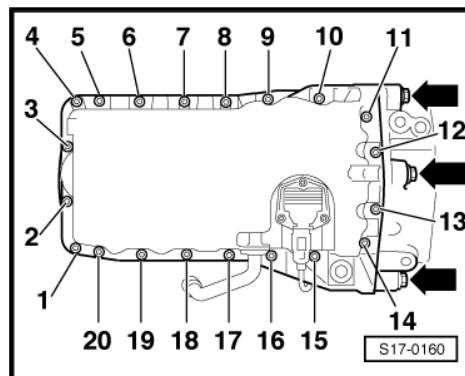
- ♦ *The sealant bead must not be thicker than 3 mm otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.*
- ♦ *Take particular care when applying the sealant bead in the area of the sealing flange (gearbox side) -arrows-.*
- ♦ *The oil pan must be installed within 5 minutes after applying the silicone sealant - D 176 600 A1- .*

- Fit on oil pan immediately and tighten the bolts as follows:
- First of all pre-tighten screws -1...20- crosswise to 5 Nm.
- Tighten the bolts of the oil pan/gearbox -arrows- to a torque of 40 Nm.
- Tighten screws -1...20- crosswise to 15 Nm.



Note

- ♦ *When installing the oil pan with the engine removed, ensure that the oil pan is flush with the cylinder block at the flywheel side.*
- ♦ *Let sealant dry for approx. 30 minutes after installing oil sump. Only then fill with engine oil.*
- Fill with engine oil and check the oil level ⇒ Maintenance ; Booklet Octavia II .



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1.3 Removing and installing oil pump

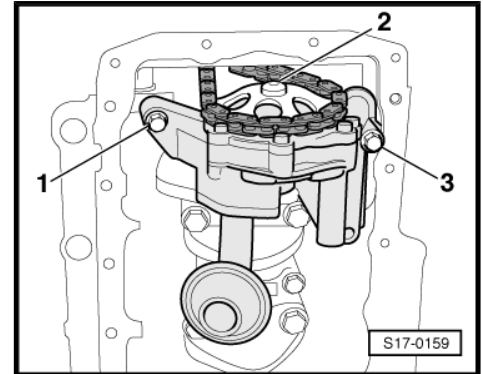
Removing

- Removing the oil pan ➔ [page 87](#) .
- Remove baffle ➔ [page 84](#) .
- Release screw -2-.
- Pull the chain sprocket off the oil pump shaft.
- Release screws -1- and -3- and remove oil pump.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Insert top dowel sleeves into the oil pump.
- Oil pump shaft/chain sprocket installation position: the sprocket can only be installed on the shaft in one position
- Replace the screw in the oil pump chain sprocket.
- Installing the oil pan ➔ [page 87](#) .



1.4 Testing oil pressure and oil pressure switch

Special tools and workshop equipment required

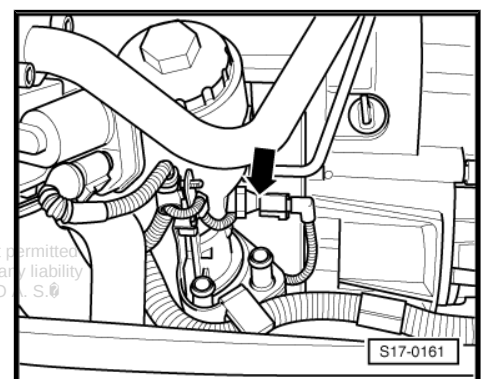
- ◆ Oil pressure tester , e.g. -V.A.G 1342-
- ◆ Voltage tester , e. g. -V.A.G 1527 B-
- ◆ Auxiliary measuring set, , e. g. -V.A.G 1594 C-

Test conditions

- Oil level o.k.
- Engine oil temperature approx. 80 C.

Test preparations

- Remove inlet connection on the lock carrier and air guide hose ➔ [page 148](#) .
- Remove the plug -arrow- on the oil pressure switch - F1- and unscrew the oil pressure switch - F1- .



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- Screw the connection of the oil pressure tester - V.A.G 1342- into the hole for the oil pressure switch.
- Screw the oil pressure switch -2- into the oil pressure tester.

Testing oil pressure switch

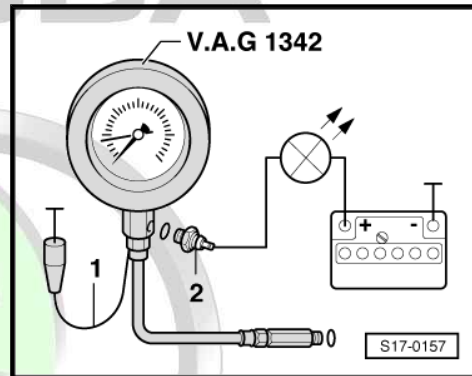
- Connect brown cable -1- of oil pressure tester to earth (-).
- Unclamp the voltage tester with its auxiliary cables out of the measuring tool set on the oil pressure switch and plus (+) terminal on the battery.
- The LED must not light up.

If the LED lights up:

- Replace oil pressure switch.

Diode does not light up:

- Start the engine.



Note

Observe the testing equipment and the LED while actuating the starter since the switching point of the oil pressure switch can already be exceeded when starting up.

- The LED must come on at an overpressure of 0.055 ... 0.085 MPa (0.55 ... 0.85 bar).

If the LED does not light up:

- Replace oil pressure switch.

Testing oil pressure

- Start the engine.
- Oil pressure when engine idling: at least 0.08 MPa (0.8 bar).
- Oil pressure at 2000 rpm: min. 0.2 MPa (2.0 bar)

If the specified values are not reached: Oil pump defective.

- Replace oil pump ⇒ [page 89](#) .
- Oil pressure at a higher engine speed: max. 0.7 MPa (7.0 bar).

If the specified value is exceeded: Pressure relief valve defective.

- Replace oil filter holder ⇒ [page 86](#) .

19 – Cooling

1 Removing and installing parts of the cooling system



WARNING

Hot steam may escape when the coolant expansion reservoir is opened.

- ◆ *Wear safety goggles and safety clothing to avoid eye injuries and scalding.*
- ◆ *Cover the cap with a cloth and open carefully.*



Note

- ◆ *When the engine is warm the cooling system is under pressure. If necessary, release pressure before beginning repair work.*
- ◆ *Secure all hose connections with corresponding hose clips.*
- ◆ *Spring-type clip pliers are recommended for installation of spring-type clips.*
- ◆ *Replace seals and sealing rings.*
- ◆ *The arrows affixed to the coolant pipes and the coolant hoses must stand opposite to each other.*

1.1 Parts of cooling system on the side next to the body - Summary of components

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1 - Top coolant hose

- ☐ to connection fitting laterally at cylinder head
- ☐ Connection diagram for coolant hoses
⇒ [page 95](#)

2 - O-ring

- ☐ Replace if damaged.

3 - Radiator

- ☐ Removing and installing
⇒ [page 99](#)
- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)

4 - Screw cap

- ☐ Test pressure
0.14...0.16 MPa
(1.4...1.6 bar)
- ☐ Check ⇒ [page 102](#)

5 - Connector

6 - 3 Nm

7 - Coolant expansion tank

8 - 5 Nm

9 - 5 Nm

10 - Bottom coolant hose

- ☐ to connection fitting for coolant regulator at cylinder block
- ☐ Connection diagram for coolant hoses
⇒ [page 95](#)

11 - Right radiator fan - V35-

- ☐ Removing and installing ⇒ [page 99](#)

12 - Connector

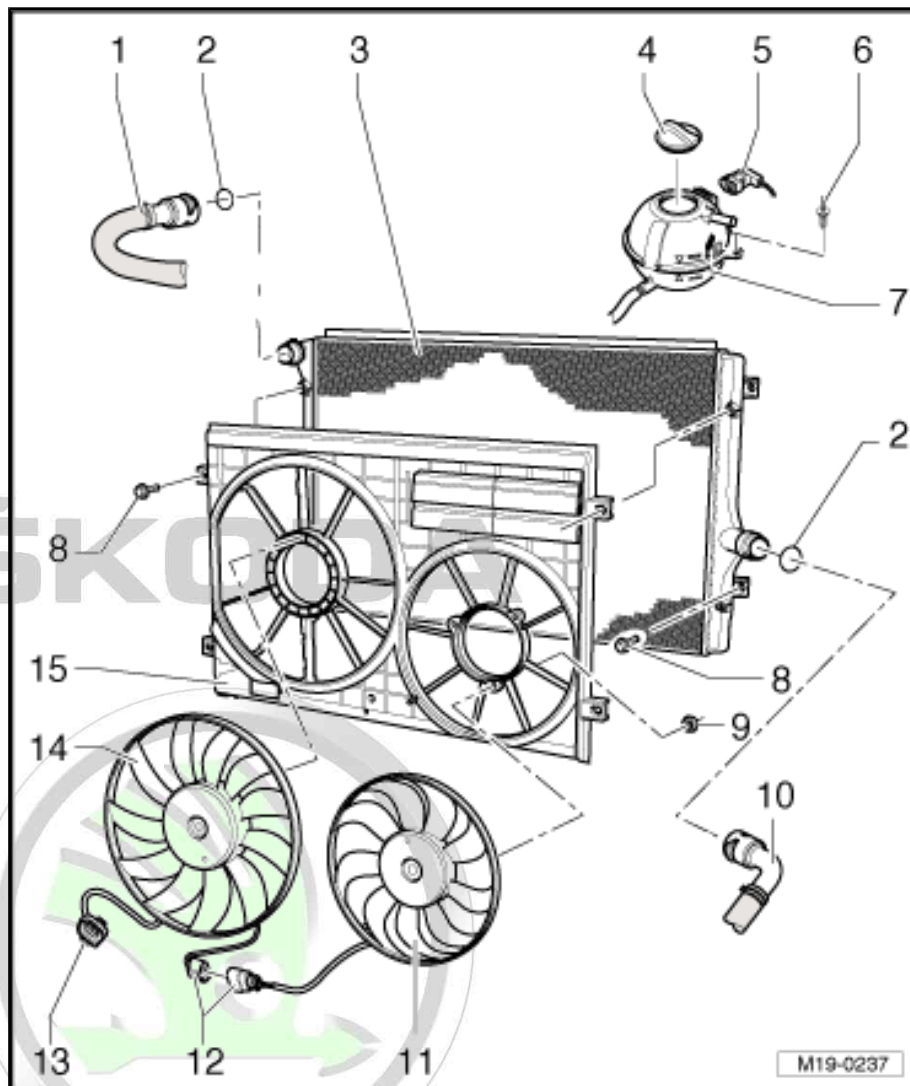
13 - Connector

14 - Radiator fan - V7-

- ☐ with radiator fan control unit - J293-
- ☐ Removing and installing ⇒ [page 99](#)

15 - Fan shroud

- ☐ Removing and installing ⇒ [page 99](#)



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1.2 Parts of cooling system engine side - Summary of components

1 - O-ring

- ☐ replace

2 - Retaining clip

- ☐ Check for secure seating

3 - Coolant temperature sender - G62-

4 - Hose

- ☐ to radiator for exhaust gas recirculation
- ☐ Connection diagram for coolant hoses
⇒ [page 95](#)

5 - Connection fitting

- ☐ at cylinder head
- ☐ with coolant temperature sender - G62-

6 - 10 Nm

7 - from heat exchanger

- ☐ Return-flow line
- ☐ Connection diagram for coolant hoses
⇒ [page 95](#)

8 - 40 Nm

9 - Hose

- ☐ to cylinder head

10 - Hose

- ☐ to the coolant tube at the top

11 - Distributor part

12 - Hose

- ☐ to the distributors

13 - Hose

- ☐ To connection fitting at cylinder head

14 - Hose

- ☐ towards top radiator

15 - Distributor part

16 - 15 Nm

17 - Hose

- ☐ from the engine oil cooler

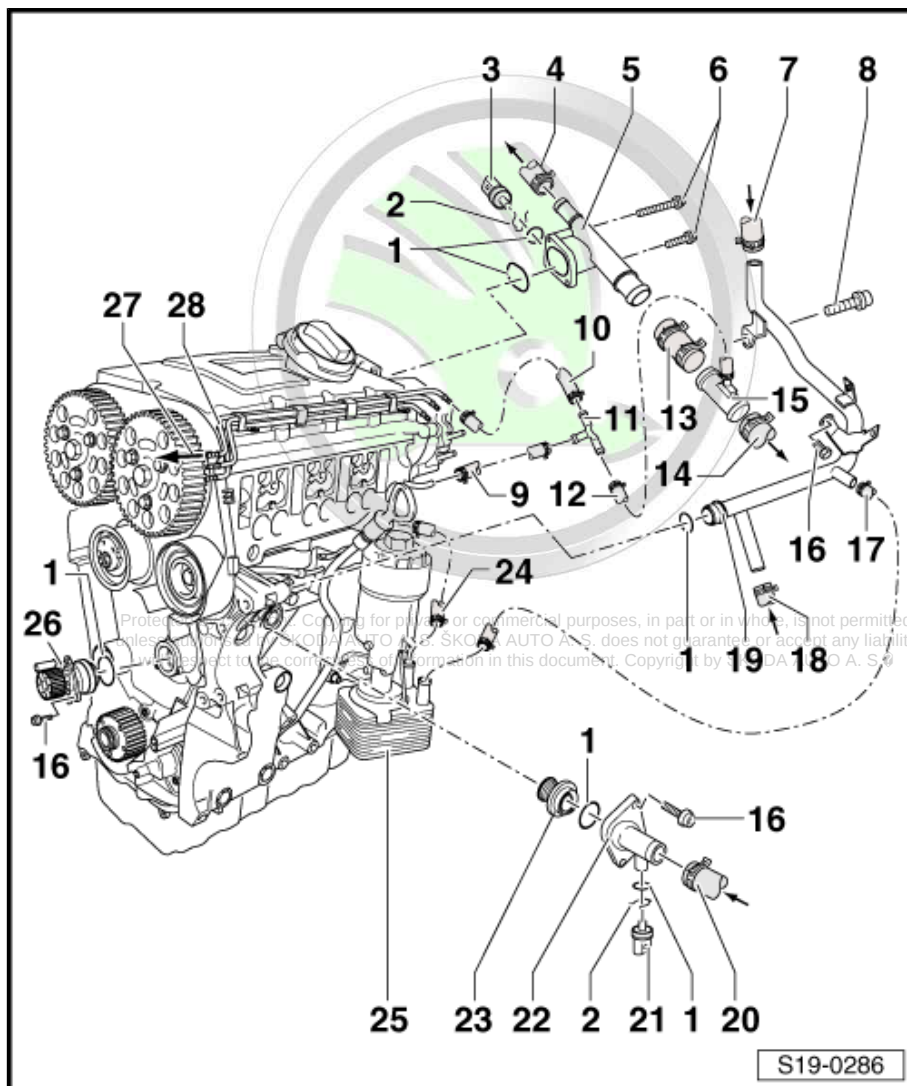
18 - from the bottom coolant expansion tank

- ☐ Connection diagram for coolant hoses ⇒ [page 95](#)

19 - Coolant pipe

20 - Hose

- ☐ from bottom of radiator





21 - Coolant temperature sender at radiator outlet - G83-

22 - Connection fitting

- ☐ with coolant regulator
- ☐ with coolant temperature sender at radiator outlet - G83-

23 - Coolant regulator

- ☐ Removing and installing ⇒ [page 100](#)
- ☐ check: heat up regulator in a water bath

Start of opening: approx. 87 ° C

Full opening: approx. 102 ° C

Stroke: at least 7 mm

24 - Hose

- ☐ from the connection to the cylinder block

25 - Engine oil cooler

- ☐ Removing and installing ⇒ [page 86](#)

26 - Coolant pump

- ☐ check smooth operation
- ☐ Check fitting position
- ☐ Removing and installing ⇒ [page 100](#)

27 - to the coolant expansion tank at the top

- ☐ Connection diagram for coolant hoses ⇒ [page 95](#)

28 - Top coolant pipe

- ☐ bolted to intake manifold



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1.3 Connection diagram for coolant hoses

For vehicles without auxiliary heating.

1 - Coolant expansion tank

- ☐ with cap
- ☐ Check the overpressure valve in the screw cap
⇒ [page 102](#)

2 - Cylinder head and cylinder block

- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)

3 - Radiator for exhaust gas recirculation

- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)
- ☐ Removing and installing
⇒ [page 163](#)

4 - Heat exchanger for heating

- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)

5 - Engine oil cooler

- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)
- ☐ Removing and installing
⇒ [page 86](#)

6 - Radiator

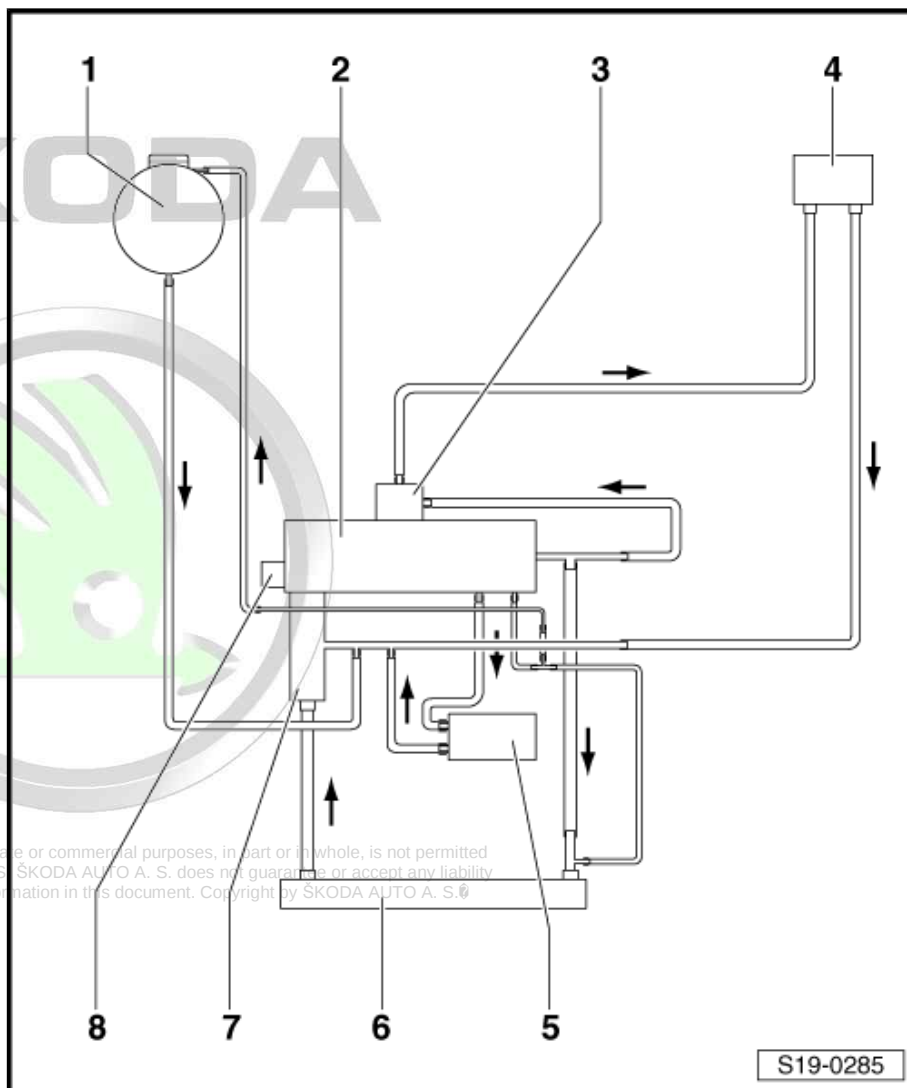
- ☐ Removing and installing
⇒ [page 99](#)
- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)

7 - Coolant regulator

- ☐ Removing and installing ⇒ [page 100](#)

8 - Coolant pump

- ☐ Removing and installing ⇒ [page 100](#)



For vehicles with auxiliary heating



1 - Coolant expansion tank

- ☐ with cap
- ☐ Check the overpressure valve in the screw cap
⇒ [page 102](#)

2 - Cylinder head and cylinder block

- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)

3 - Radiator for exhaust gas recirculation

- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)
- ☐ Removing and installing
⇒ [page 163](#)

4 - Heat exchanger for heating

- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)

5 - Engine oil cooler

- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)
- ☐ Removing and installing
⇒ [page 86](#)

6 - Radiator

- ☐ Removing and installing
⇒ [page 99](#)
- ☐ After replacing, fill with fresh coolant
⇒ [page 96](#)

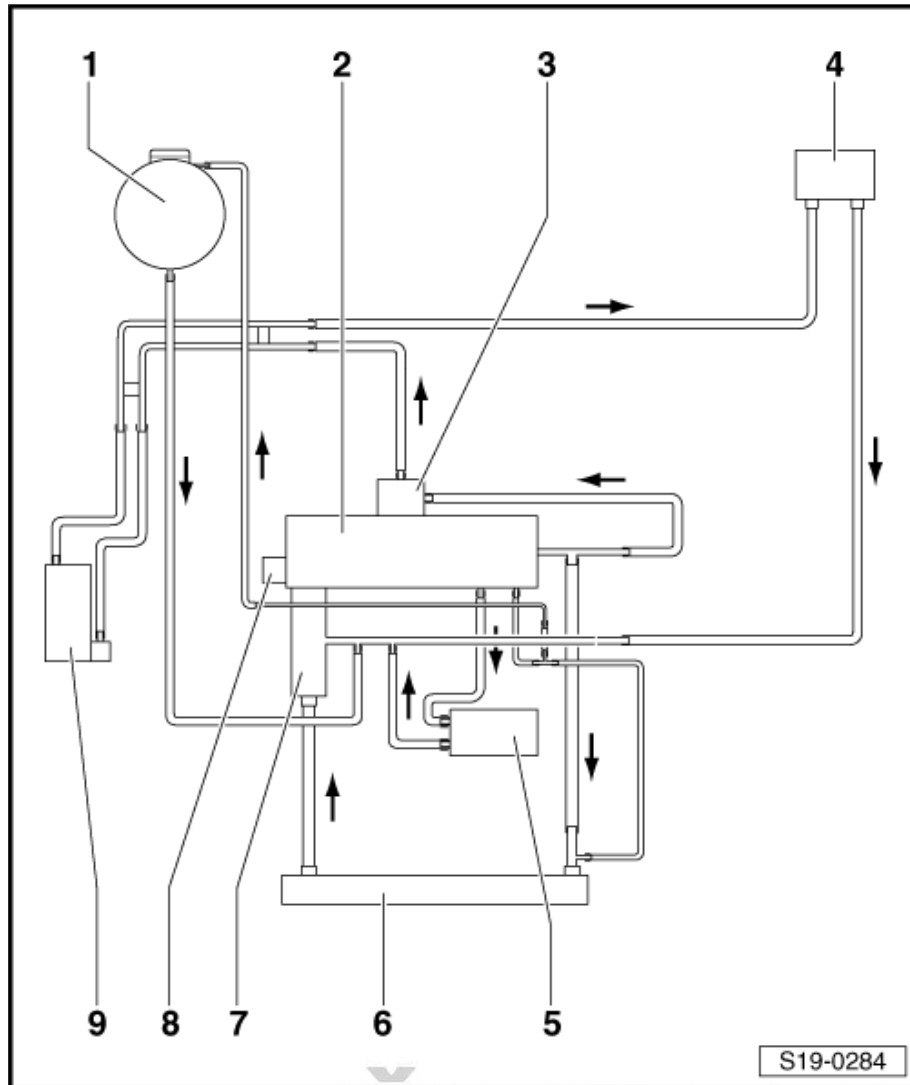
7 - Coolant regulator

- ☐ Removing and installing ⇒ [page 100](#)

8 - Coolant pump

- ☐ Removing and installing ⇒ [page 100](#)

9 - Auxiliary heating



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1.4 Draining and filling coolant

Special tools and workshop equipment required

- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Pliers for spring-type clips
- ◆ Refractometer - T10007-

Draining



Note

Collect drained coolant in a clean container for proper disposal or reuse.

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WARNING

Hot steam may escape when the coolant expansion reservoir is opened.

- ◆ *Wear safety goggles and safety clothing to avoid eye injuries and scalding.*
- ◆ *Cover the cap with a cloth and open carefully.*

- Open the cap of the coolant expansion reservoir.
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Place a catch pan under the engine.
- Remove right charge air hose, to do so, undo the retaining clips -arrows-.



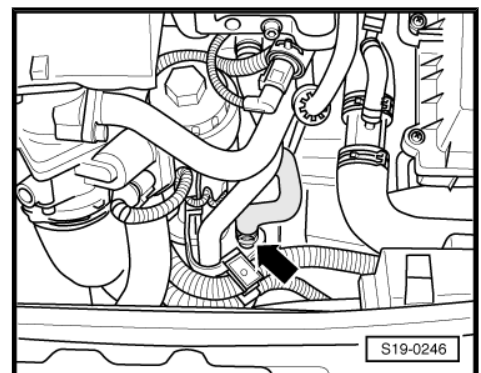
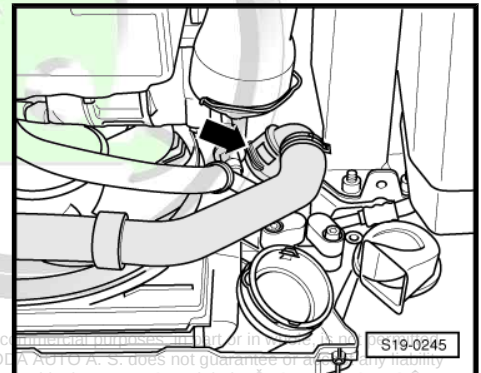
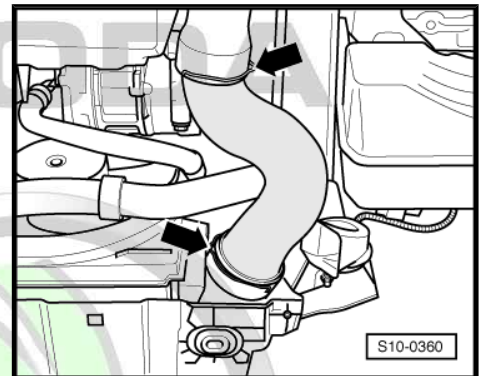
WARNING

Shut off the opening of the charge air cooler, e.g. with a clean foam piece, so that no coolant can penetrate.

- Remove the right coolant hose from the radiator; to do so pull the retaining clip -arrow-.
- Remove inlet connection on the lock carrier and air guide hose ⇒ [page 148](#) .

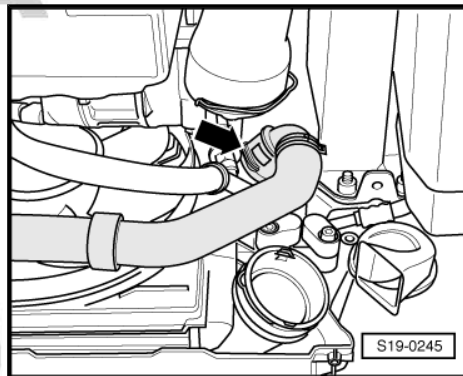
- Detach the rear coolant hose on the engine oil cooler -arrow- and drain residual coolant.

Filling up





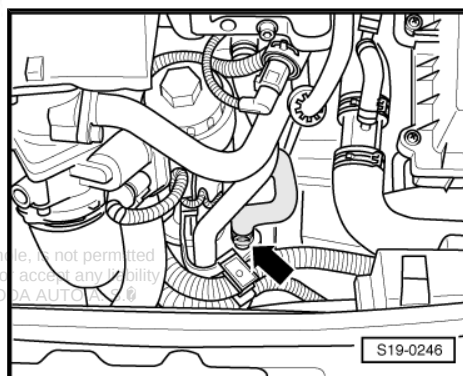
- Connect right coolant hose at radiator -arrow-.



- Connect rear coolant hose to engine oil cooler -arrow-.

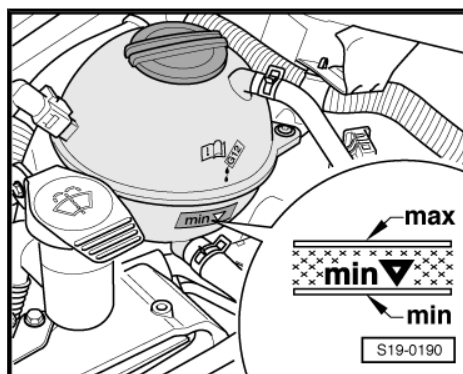
Select the appropriate coolant additive from the ➔ Electronic Catalogue of Original Parts or from the list of allowed coolant additives ➔ Maintenance ; Booklet Octavia II .

- In a clean reservoir mix water and coolant additive in the correct mixing ratio ➔ Maintenance ; Booklet Octavia II .

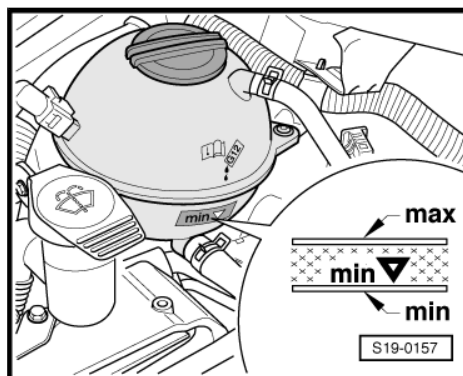


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- Top up coolant through the neck of the expansion reservoir, until it reaches the max. marking.
- Switch off the heater unit and air conditioning unit.
- Start engine and run at a speed of approx. 1500 rpm for max. 2 minutes. When doing so, fill coolant into the expansion tank up to the max. marking.
- Tighten the cap of the coolant expansion reservoir.
- Tighten the cap of the coolant expansion reservoir.
- Run engine until fan starts.



- Check coolant level when the coolant expansion reservoir is closed.
- When engine is at operating temperature the coolant level must be at the maximum marking, when engine is cold between the minimum and the maximum markings.



WARNING

Hot steam may escape when the coolant expansion reservoir is opened.

- ◆ **Wear safety goggles and safety clothing to avoid eye injuries and scalding.**
- ◆ **Cover the cap with a cloth and open carefully.**

- If necessary, top up with coolant.

Further installation occurs in reverse order.

1.5 Removing and installing fan shroud with radiator fan - V7- and right radiator fan - V35-

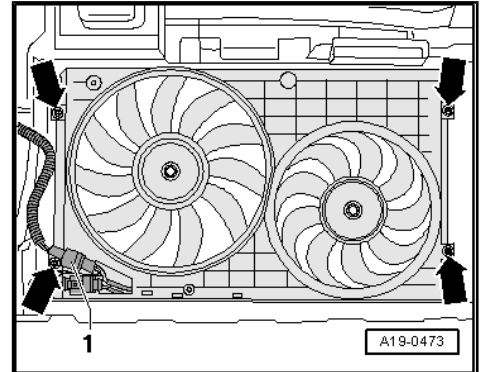
Removing

- Remove engine cover ⇒ [page 13](#) .
- Remove inlet connection on the lock carrier and air guide hose ⇒ [page 148](#) .
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Disconnect plug connection -1-.
- Unscrew screws -arrows- and remove fan shroud with radiator fans in an upwards direction.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ◆ Tightening torques: ⇒ [page 91](#)



1.6 Removing and installing radiator

Special tools and workshop equipment required

- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Pliers for spring-type clips

Removing

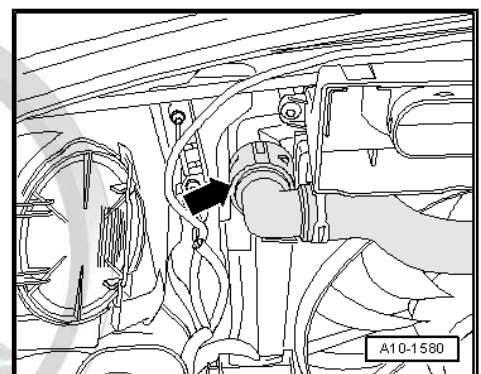
- Switch off ignition and pull out ignition key.



Note

Collect drained coolant in a clean container for proper disposal or reuse.

- Drain coolant ⇒ [page 96](#) .
- Detach top coolant hose from the radiator -arrow-.
- Remove fan shroud with radiator fans ⇒ [page 99](#) .
- Disconnect plug from the high pressure sender - G65-



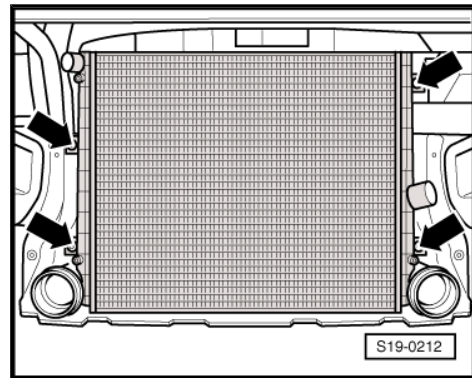


- Screw out screws -arrows- and remove the radiator upwards.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ♦ Tightening torques: ➔ [page 91](#)
- If a new radiator has been fitted, the old (drained) coolant must not be used for topping up.
- Top up coolant ➔ [page 96](#) .



1.7 Removing and installing coolant pump

Removing

- Drain coolant ➔ [page 96](#) .
- Remove toothed belt ➔ [page 23](#) .
- Unscrew fixing bolts -1- of the coolant pump and remove the coolant pump -2-.
- Remove O-ring -3-.

Installing

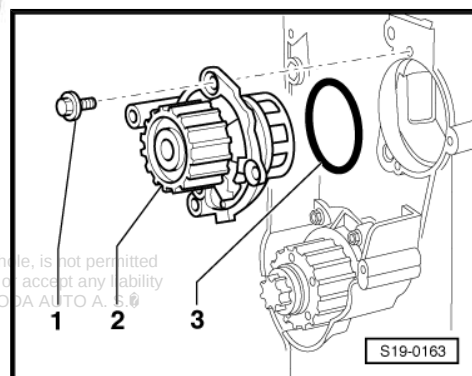
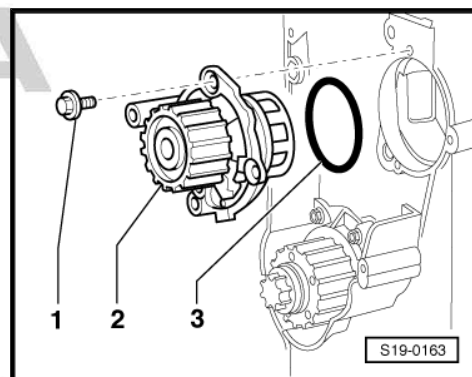
Installation occurs in reverse order to removal. Pay attention to the following:



Note

Renew O-ring.

- Clean sealing surface for O-ring or smoothen.
- Moisten the new O-ring -3- with coolant.
- Attach the coolant pump -2-.
- Fitting position: Plug in housing points down.
- Tighten screws -1- of coolant pump to 15 Nm.



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1.8 Removing and installing coolant regulator

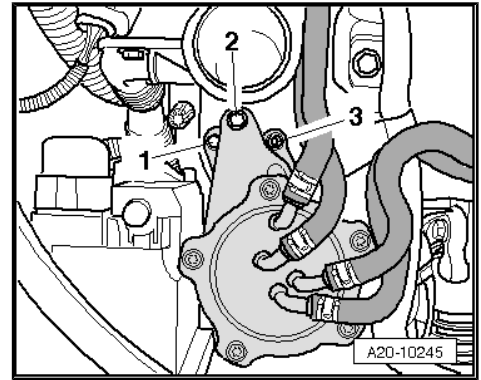
Special tools and workshop equipment required

- ♦ Catch pan for workshop cranes , e.g. -VAS 6208-
- ♦ Pliers for spring-type clips

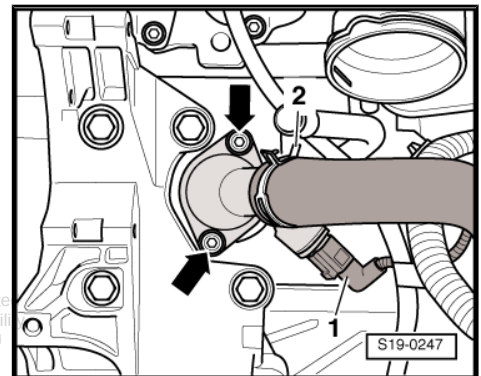
Removing

- Disconnect battery ➔ Electrical System ➔ Rep. gr. 27 .
- Drain coolant ➔ [page 96](#) .

- Release screw -1- by one turn.
- Release screw -2- and nut -3-.
- Lay fuel filter to the side with the hoses connected.
- Unscrew alternator ⇒ Electrical System ⇒ Rep. gr. 27 and place it at the top right-hand side. The hoses remain connected.



- Detach coolant hose -2- from connecting piece.
- Disconnect plug -1- at the coolant temperature sender at radiator outlet - G83- .
- Screw out screws -arrows- and remove connection fittings.



- Turn coolant regulator -1- approx. 90° (1/4 turn) anti-clockwise -arrow- and remove from connecting piece.
- Remove O-ring -2-.

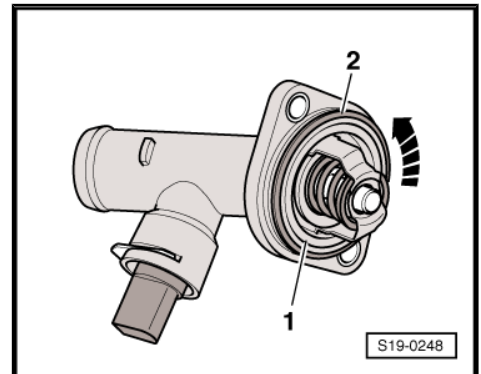
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Note

Renew O-ring.



- Clean sealing surface for O-ring or smoothen.
- Insert coolant regulator with new O-ring.
- Installation position: The bracket of the coolant regulator must be positioned vertically.
- Moisten O-ring with coolant.
- Install the connecting piece on the cylinder block, tighten the screws to 15 Nm and connect the hose from the radiator.
- Install alternator ⇒ Electrical System ⇒ Rep. gr. 27 .
- Carry out cohesive work when reconnecting the battery ⇒ Electrical System ⇒ Rep. gr. 27 .

1.9 Check cooling system for leaks

Special tools and workshop equipment required

- ◆ Cooling system testing device , e.g. -V.A.G 1274-
- ◆ Adapter e.g. -V.A.G 1274/8-
- ◆ Adapter e.g. -V.A.G 1274/9-



Test condition

- Engine must be warm.

Test sequence



WARNING

Hot steam may escape when the coolant expansion reservoir is opened.

- ◆ *Wear safety goggles and safety clothing to avoid eye injuries and scalding.*
- ◆ *Cover the cap with a cloth and open carefully.*

- Open the cap of the coolant expansion reservoir.
- Fit the cooling system testing device - V.A.G 1274- onto the coolant expansion tank using adapter - V.A.G 1274/8- .
- Generate an overpressure of approx. 0.1 MPa (1.0 bar) to test the cooling system.

If pressure drops:

- Search position of the leak and repair fault.

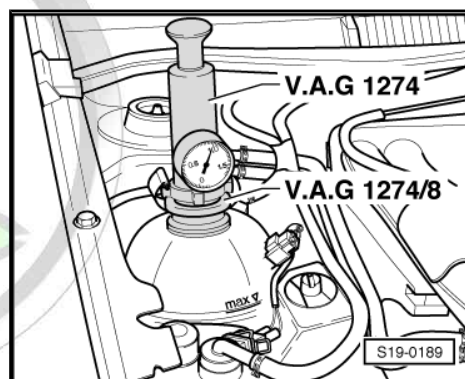
Testing the pressure relief valve in the cap

- Fit the cooling system testing device - V.A.G 1274- onto the coolant expansion tank using adapter - V.A.G 1274/9- .
- To check the pressure relief valve, create an overpressure.

- The pressure relief valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).

If the pressure relief valve does not open:

- Renew cap.



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20 – Fuel supply system

1 Removing and installing parts of the fuel supply system

Note

- ◆ Fuel lines are secured with quick-release couplings.
- ◆ Fuel hoses must be secured only with spring strap clips. The use of clamp-type or screw-type clips is not allowed.
- ◆ Spring-type clip pliers are recommended for installation of spring-type clips.

Observe the safety instructions ➔ [page 3](#) .

Observe rules for cleanliness ➔ [page 4](#) .

1.1 Fuel tank with attached parts

1 - Mounting part

2 - Screw cap

- ☐ replace the O-ring if it is damaged

3 - Earth connection

4 - 11 Nm

5 - Mounting bracket

6 - 25 Nm

- ☐ replace

7 - Fuel tank

- ☐ when removing, support using the engine/gear-box jack , e.g. -V.A.G 1383 A-
- ☐ Removing and installing ➔ [page 108](#)

8 - Circlip

9 - Unbolt bracket for exhaust pipe

10 - Tensioning strap

- ☐ Check fitting position

11 - Heat shield

12 - Fuel cooler

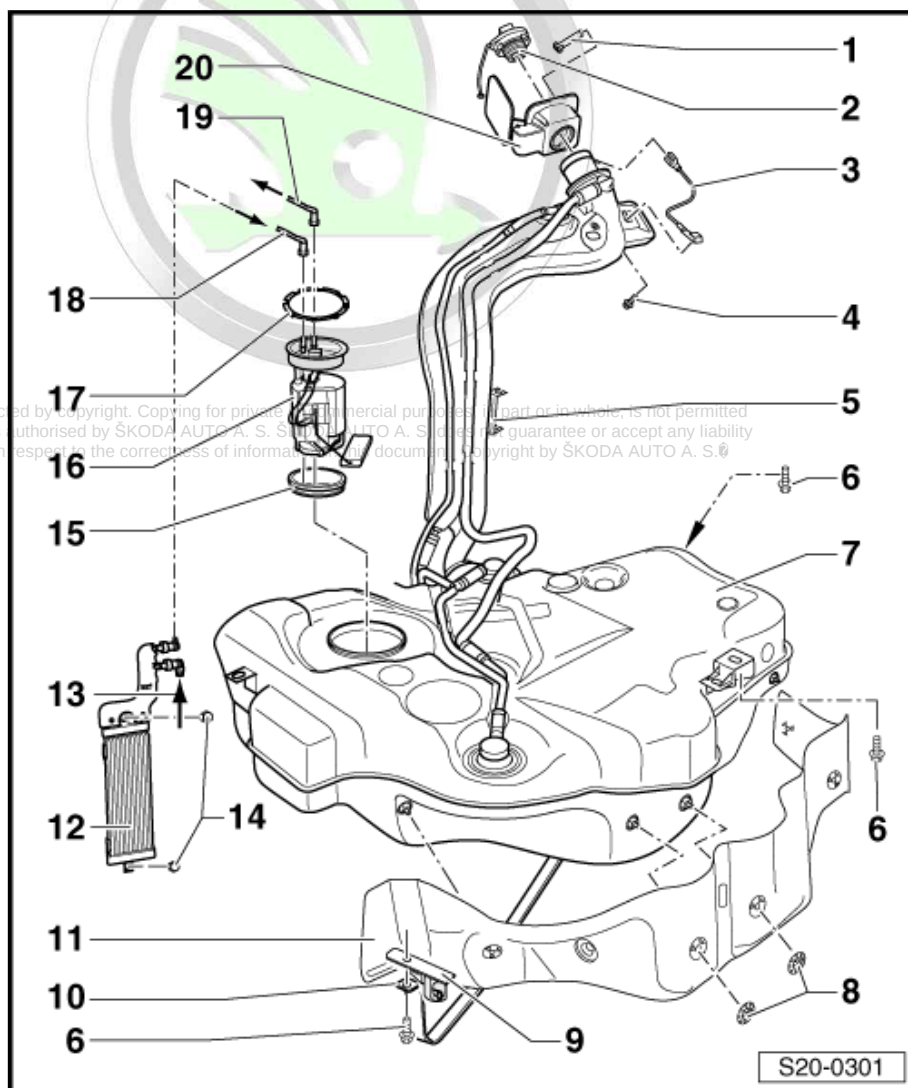
- ☐ Removing and installing ➔ [page 108](#)

13 - to fuel filter

14 - 20 Nm

15 - Sealing ring

- ☐ replace
- ☐ to be inserted dry into the opening of the fuel tank





- ☐ must be moistened on the inside with fuel before assembly of the fuel delivery unit

16 - Fuel pump

- ☐ with sender for fuel gauge display
- ☐ Removing and installing ⇒ [page 110](#)
- ☐ Note installation position on the fuel tank ⇒ [page 104](#)
- ☐ inspecting fuel pump ⇒ [page 118](#)
- ☐ Clean strainer if dirty
- ☐ removing and installing the sender for fuel gauge ⇒ [page 112](#)

17 - Lock ring - 110 Nm

- ☐ use wrench - T30101 (3087)- for removing and installing
- ☐ check for firm seating

18 - Fuel return-flow line

- ☐ from fuel cooler
- ☐ clipped in place on fuel tank
- ☐ check for firm seating
- ☐ blue

19 - fuel feed line

- ☐ to fuel filter
- ☐ clipped in place on fuel tank
- ☐ check for firm seating
- ☐ black

20 - Fuel tank lid unit

- ☐ with rubber bowl
- ☐ removing and installing ⇒ Body Work ⇒ Rep. gr. 55

Fitting location of the fuel delivery unit

The marking -3- on the flange of the fuel delivery unit points against the direction of travel.



Note

The fuel delivery unit can only be installed in this position.

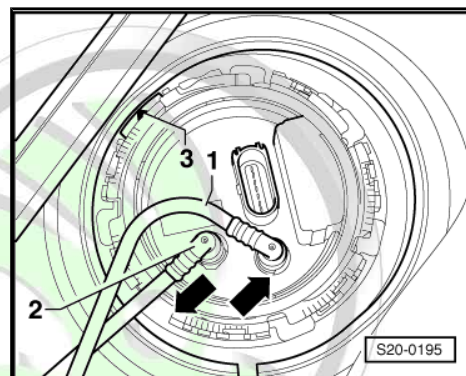
Blue fuel return line -1-.

Black fuel supply line -2-.



Note

After installing the fuel delivery unit, check whether the feed line and the return-flow line are clipped correctly in place on the fuel tank.



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1.2 Removing and installing fuel filter

Fuel filter type one



Note

Before disconnecting the fuel hoses, mark assignment to the supports.

1 - Fuel intake hose

- ☐ from fuel tank
- ☐ white marking

2 - 8 Nm

3 - Fuel return-flow hose

- ☐ to fuel cooler
- ☐ blue marking

4 - Drain plug

- ☐ Unscrew and bleed (collect) about 0.1 l of fluid with diesel extractor, e.g. -VAS 5226- or with hand vacuum pump, e.g. -VAS 6213-, and bleeding container, e.g. -V.A.G 1390/1-.

5 - Sealing ring

- ☐ replace

6 - Fuel intake hose

- ☐ to the tandem pump
- ☐ white marking

7 - Fuel filter - top part

8 - Retaining clip

- ☐ Replace if damaged.

9 - Fuel temperature sender - G81-

10 - Fuel intake hose

- ☐ from the tandem pump
- ☐ blue marking
- ☐ with connection fitting for fuel temperature sender - G81-

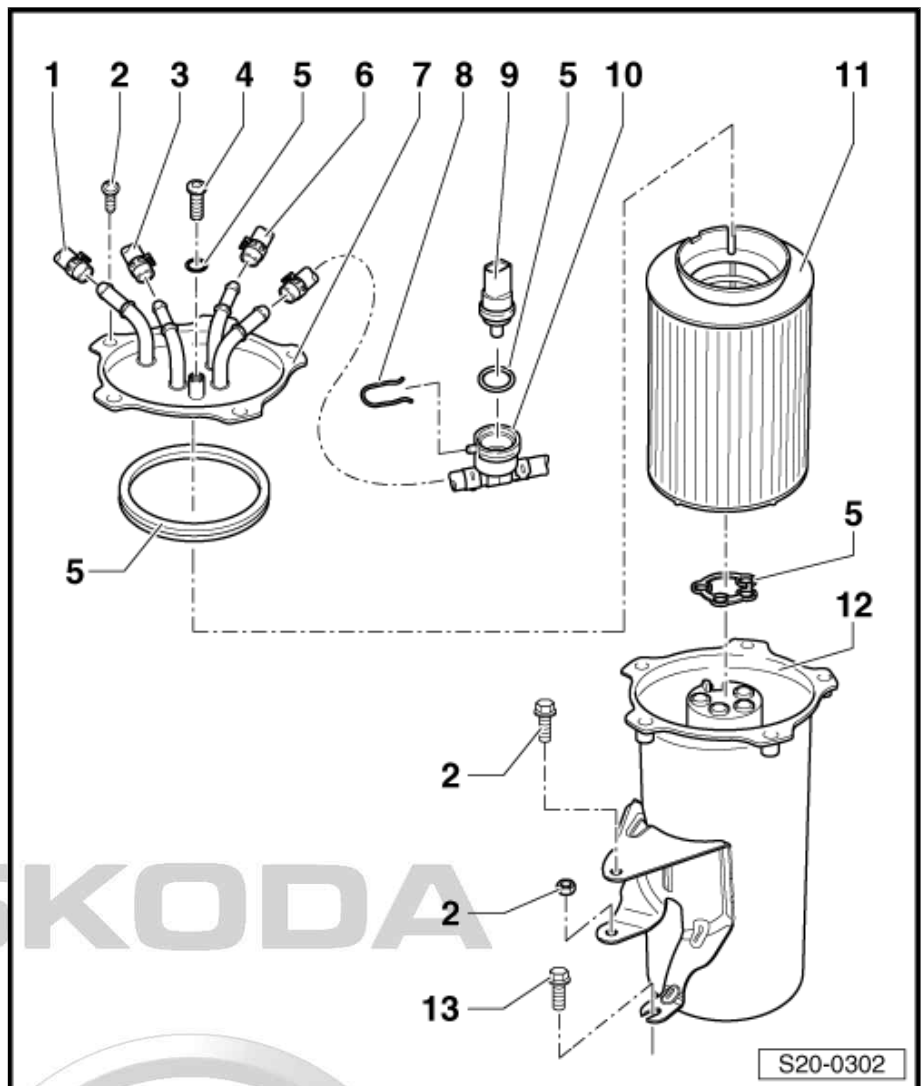
11 - Fuel filter element

- ☐ Keep to change intervals ⇒ Maintenance ; Booklet Octavia II.

12 - Fuel filter with integrated bracket

13 - 8 Nm

- ☐ to remove fuel filter only slacken screw





Fuel filter type two and three



Note

Before disconnecting the fuel hoses, mark assignment to the supports.

1 - Fuel intake hose

- ☐ from fuel tank
- ☐ white marking

2 - Fuel intake hose

- ☐ to fuel cooler
- ☐ blue marking

3 - Intake hose

- ☐ to the tandem pump
- ☐ white marking

4 - Screw

- ☐ for type 2 (left part of the figure): 9 Nm
- ☐ for type 3 (right part of the figure): 5 Nm

5 - Retaining clip

- ☐ Replace if damaged.

6 - Fuel temperature sender - G81-

7 - Sealing ring

- ☐ replace

8 - Fuel intake hose

- ☐ from the tandem pump
- ☐ blue marking
- ☐ with connection fitting for fuel temperature sender -G81-

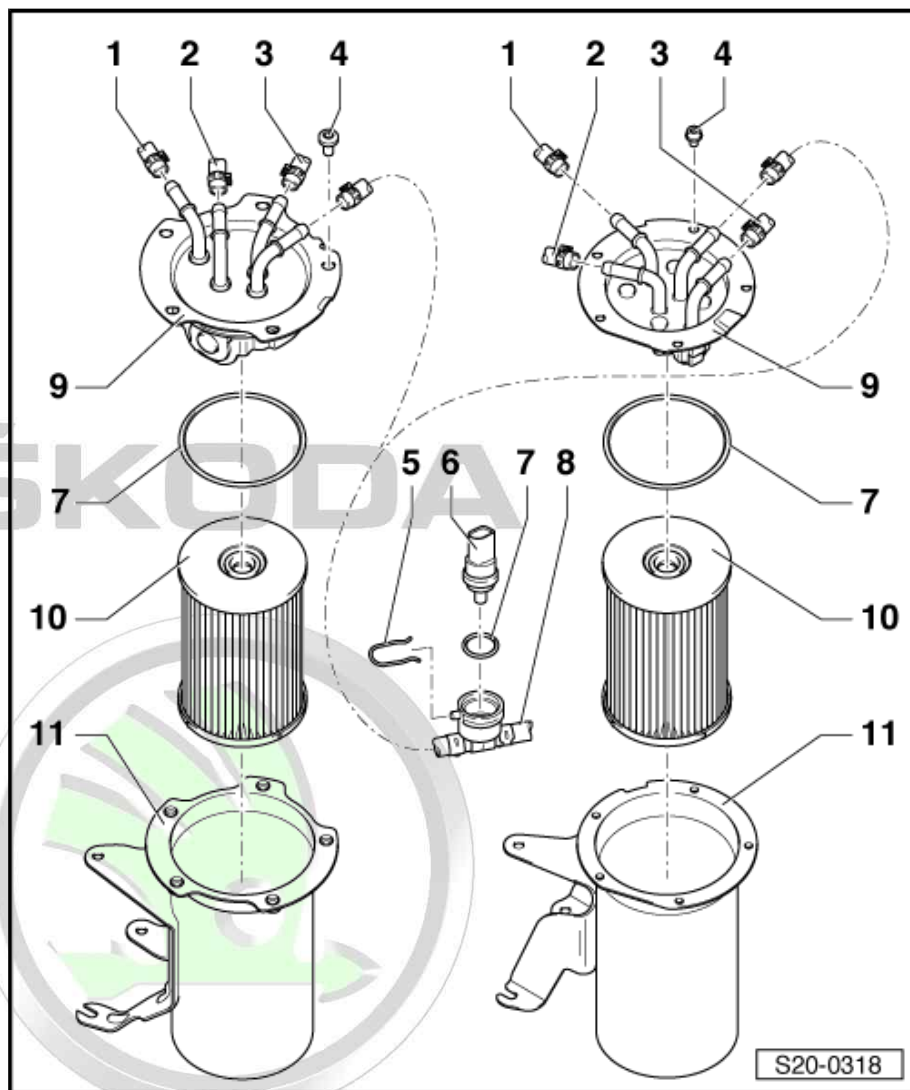
9 - Fuel filter - top part

- ☐ with integrated preheating valve

10 - Filter element

- ☐ Keep to change intervals ⇒ Maintenance ; Booklet Octavia II.
- ☐ Pay attention to the part number

11 - Fuel filter with integrated bracket - bottom part.



1.3 Extract fuel from the fuel tank

Special tools and workshop equipment required

- ◆ Hose adapter , e. g. -V.A.G 1318-16-
- ◆ Adapter e.g. -V.A.G 1318-17-
- ◆ Auxiliary measuring set, , e. g. -V.A.G 1594 C-
- ◆ Battery
- ◆ Fuel tank

i Note

If there are functional problems of the fuel delivery unit suction off fuel with fuel extraction device, e.g. -VAS 5190-.

Work procedure

i Note

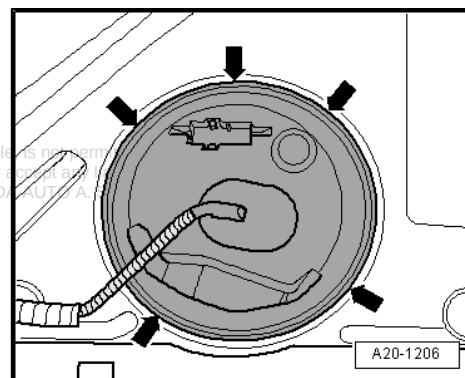
♦ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).

♦ *Observe rules for cleanliness ⇒ [page 4](#).*

- Switch off ignition and pull out ignition key.
- Removing rear seat bench ⇒ Body Work ⇒ Rep. gr. 72.
- Unclip retaining catches -arrows- of cover for the fuel delivery unit and remove cover.

i Note

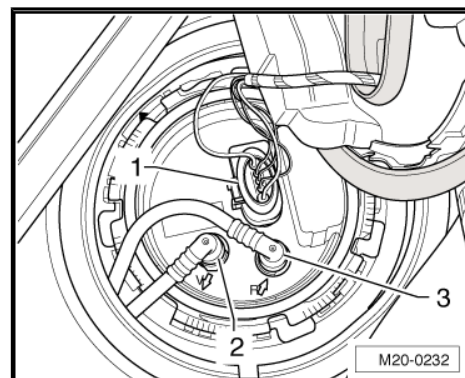
On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.



- Unplug the 5-pin connector -1- and the black fuel feed line -2-.

i Note

Press in the securing ring in order to unlock the line.





- Connect the adapter set - V.A.G 1318-16- and the hose adapter - V.A.G 1318/17- and fit the “drain pipe” onto the supply connection of the fuel pump.
- Hold the “drain pipe” in a suitable catch pan for fuel.
- Connect the battery and the contacts of the fuel pump with auxiliary cables -A- from the auxiliary measuring set as follows:

Battery positive terminal (+) to contact -1- of the fuel pump.

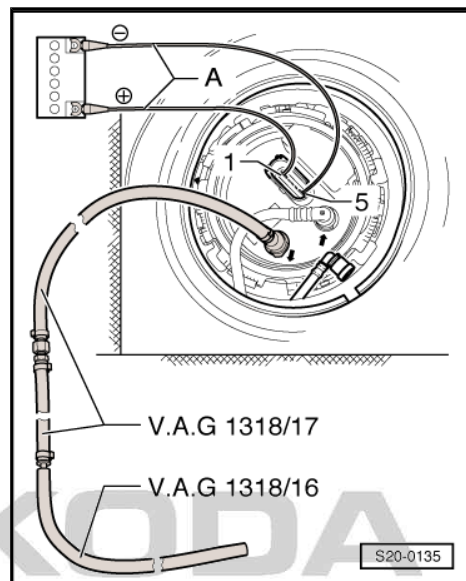
Battery negative terminal (-) to contact -5- of fuel pump.

The fuel pump runs and suctions off fuel.



WARNING

In order to prevent an overflow of fuel in case of a too small fuel tank, the fuel pump must not run unattended.



1.4 Removing and installing fuel cooler

Removing



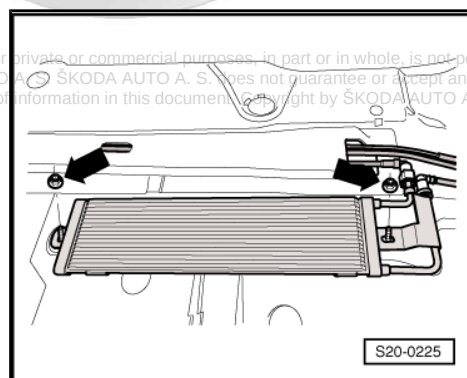
Note

- ♦ The fuel cooler is located on the fuel return-flow line to the fuel tank. It is attached to the underfloor of the vehicle body.
- ♦ Safety precautions when working on the fuel supply system ➔ [page 3](#).
- ♦ Observe rules for cleanliness ➔ [page 4](#).
- Switch off ignition and pull out ignition key.
- Removing the right underfloor trim panel.
- Separate fuel lines at fuel cooler.
- Unscrew fixing nuts for fuel cooler -arrows- and remove fuel cooler.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Tighten fixing nuts for the fuel cooler to 15 Nm.



1.5 Removing and installing the fuel tank

Special tools and workshop equipment required

- ♦ Engine/gearbox jack , e.g. -V.A.G 1383 A-

Removing



Note

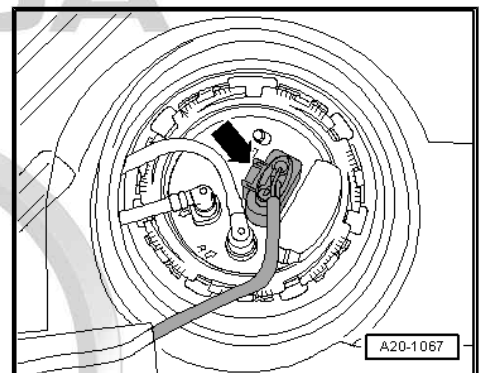
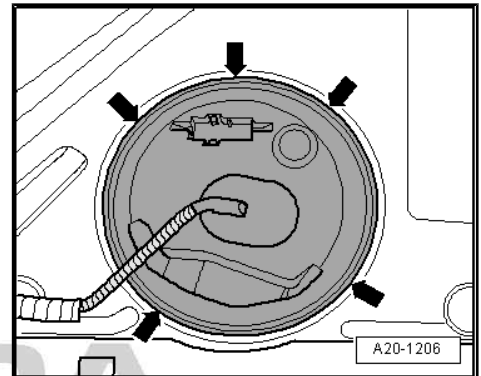
- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe rules for cleanliness* ⇒ [page 4](#).
- Switch off ignition and pull out ignition key.
- Removing rear seat bench ⇒ Body Work ⇒ Rep. gr. 72.
- Unclip retaining catches -arrows- of cover for the fuel delivery unit and remove cover.



Note

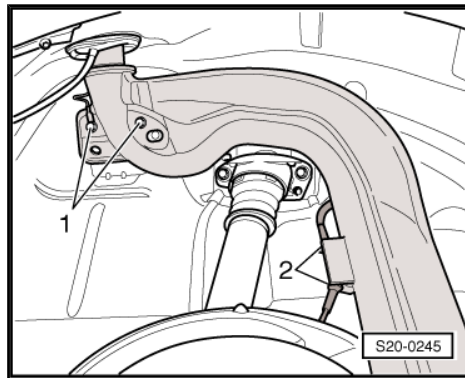
On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.

- Unplug connector -arrow-.
- Remove right rear wheel ⇒ Chassis ⇒ Rep. gr. 44.
- Open the fuel tank cap and clean around the fuel filler neck.
- Unscrew the cap from the fuel filler neck.
- Seal the opening with a clean piece of foam to prevent the ingress of foreign bodies.
- Remove the rear right wheelhouse liner ⇒ Body Work ⇒ Rep. gr. 66.





- Remove screws -1- for filler neck on the body.
- Unclip the wiring loom from the holder -2- at the top and bottom of the filler neck.
- Remove rear tunnel bridge ➔ [page 153](#) .
- Slacken front clamping sleeve at exhaust sleeve and push clamping sleeve to the rear.
- Slacken all the suspensions of the middle and rear part of the exhaust system from the retaining straps.
- Slightly lower the middle and rear part of the exhaust system and tie with wire to the body.
- Disconnect the feed line and the return-flow line on the front right of the fuel tank.



Note

- ◆ *On vehicles with auxiliary heating, the fuel line for the dosing pump - V54- must also be disconnected.*
- ◆ *Press down the securing rings in order to unlock the connections of the fuel lines.*
- Unscrew tensioning strap.
- Support the fuel tank using the engine/gearbox jack - V.A.G 1383 A- .
- Unscrew securing bolts.
- Lower fuel tank and swivel out.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ◆ Install the fuel lines without kinks.
- ◆ Do not mix-up the fuel feed line (black) and the fuel return-flow line (blue).
- ◆ Make sure the fuel line connections fit tightly.
- ◆ Check feed line and return-flow line at fuel tank for firm seating.
- ◆ Check earth connection of fuel tank/body at filler neck.

1.6 Removing and installing fuel delivery unit

Special tools and workshop equipment required

- ◆ Wrench for the lock ring - T30101 (3087)-

Condition

- The fuel tank must not be more than $\frac{3}{4}$ full.

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Removing



Note

- ◆ Drain the fuel tank ➔ [page 106](#) .
- ◆ Safety precautions when working on the fuel supply system ➔ [page 3](#) .
- ◆ Observe rules for cleanliness ➔ [page 4](#) .
- Switch off ignition and pull out ignition key.
- Removing rear seat bench ➔ Body Work ➔ Rep. gr. 72 .
- Unclip retaining catches -arrows- of cover for the fuel delivery unit and remove cover.



Note

On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.

- Disconnect the plug as well as the black fuel feed line -2- and the blue fuel return-flow line -1- from the flange.



Note

- ◆ Press in the securing ring in order to unlock the line.
- ◆ For vehicles with auxiliary heating the suction hose for the dosing pump - V54- must be pulled out additionally (open lower clamp).

- Open lock ring with the wrench - T30101- .



Note

When removing the fuel delivery unit, ensure that the float arm of the fuel gauge sender - G- is not bent.

- Pull the fuel delivery unit and the sealing ring out of the opening of the fuel tank.

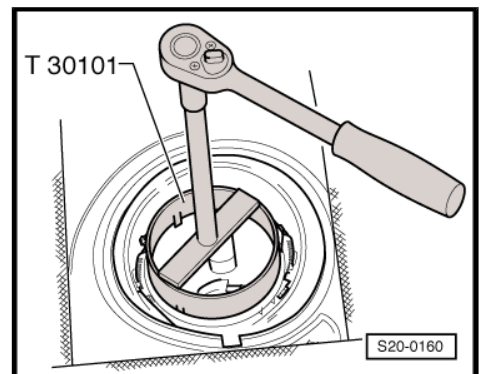
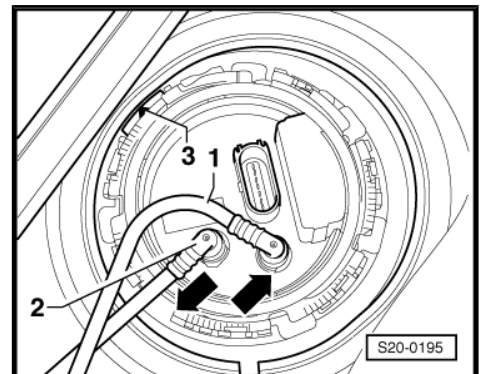
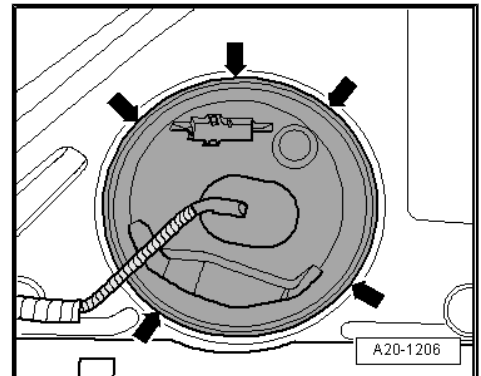


Note

You must empty the old fuel delivery unit before disposing of it if you wish to replace it.

Installing

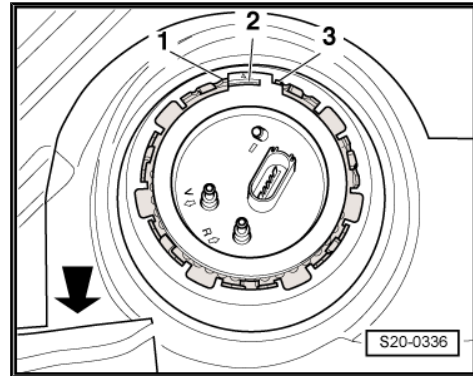
Installation occurs in reverse order to removal. Pay attention to the following:





Note

- ◆ Insert new dry sealing ring into the opening of the fuel tank.
- ◆ The gasket must only be moistened from inside with fuel before assembly of the fuel pump.
- ◆ Do not bend the sender for fuel gauge display when installing it.
- ◆ Observe the fitting location of the fuel delivery unit. The marking -3- on the flange must point against the direction of travel. The fuel delivery unit can only be installed in this position.
- ◆ Do not interchange feed line and return-flow line.
- ◆ Tighten the lock ring to 110 Nm.
- ◆ Make sure the fuel lines fit tightly.
- ◆ After installing the fuel delivery unit, check whether the feed line and the return-flow line are clipped correctly in place on the fuel tank.



1.7 Removing and installing the fuel gauge sender - G-



Note

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There are two types of sender for the fuel gauge - G- installed in vehicles. Respect to the correctness of information in this document. Copyright by SKODA AUTO A. S.

Fuel gauge sender - G- type 1

Removing

- Remove fuel delivery unit ➔ [page 110](#) .
- Unlatch and disconnect the plug connection of the lines -1- (brown), -2- (blue) and -3- (black).
- Raise securing tabs -4- and -5- with a screwdriver and remove the fuel gauge sender - - downwards -arrow-.

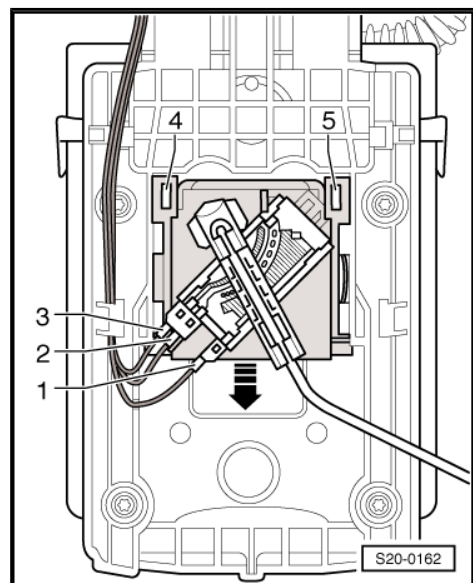
Installing

- Insert the fuel gauge sender - G- into the guides on the fuel delivery unit and press upwards until it engages.
- Connect the wiring and check correct installation of the plug.
- Install fuel delivery unit ➔ [page 110](#) .

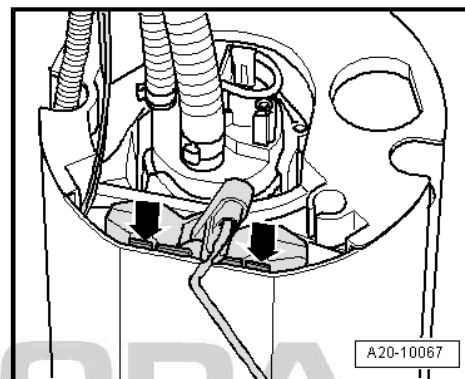
Fuel gauge sender - G- type 2

Removing

- Remove fuel delivery unit ➔ [page 110](#) .



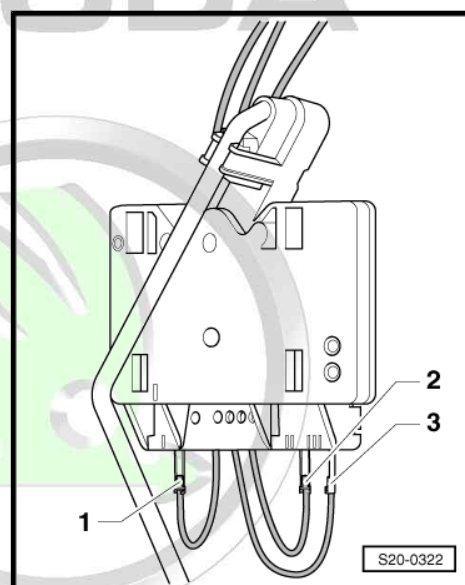
- Unlock the securing tabs -arrows- using a screwdriver and pull the fuel gauge sender - G- up and out.



- Unlatch and disconnect the plug connection of the lines -1- (brown), -2- (blue) and -3- (black).

Installing

- Connect the wiring and check correct installation of the plug.
- Insert the fuel gauge sender - G- into the guides on the fuel delivery unit and press down until it engages.
- Install fuel delivery unit ➔ [page 110](#) .



1.8 Removing and installing the tandem pump

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Special tools and workshop equipment required

- ◆ Diesel extractor , e. g. -VAS 5226-
- ◆ Pliers for spring-type clips



WARNING

The tandem pump must on no account be disassembled, otherwise the proper operation of the pump vacuum part is no longer assured. This will result in a failure of the brake booster.



Caution

Observe instructions for re-installing a used tandem pump ➔ [page 116](#) .

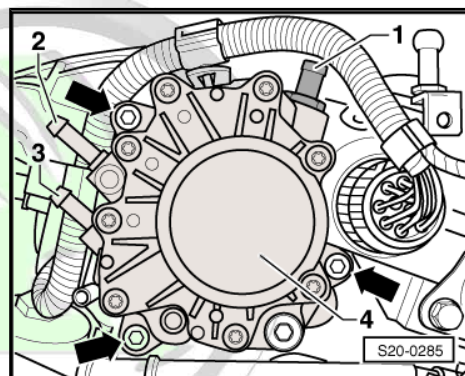
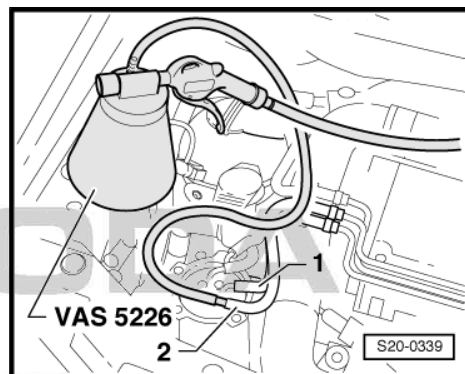


Removing



Note

- ♦ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#) .
- ♦ *Observe rules for cleanliness* ⇒ [page 4](#) .
- Remove engine cover ⇒ [page 13](#) .
- Detach the fuel intake hose -1- (marked in white) and fuel return-flow hose -2- (marked in blue) from the fuel filter.
- Connect the diesel extractor - VAS 5226- to the fuel return-flow hose -2-.
- Connect the compressed air to the diesel extractor - VAS 5226- .
- Create a vacuum with the diesel extractor - VAS 5226- until no more fuel flows out of the fuel return-flow hose.
- Remove air filter with air mass meter - G70- ⇒ [page 148](#) .
- Separate vacuum line -1- for brake servo unit from tandem pump -4-.
- Detach fuel intake hose -2- (marked in white) and fuel return-flow hose -3- (marked in blue) from the tandem pump -4-.
- Unscrew fixing screws -arrows- and remove tandem pump -4- from the cylinder head.



Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Caution

Observe instructions for re-installing a used tandem pump
⇒ [page 116](#) .

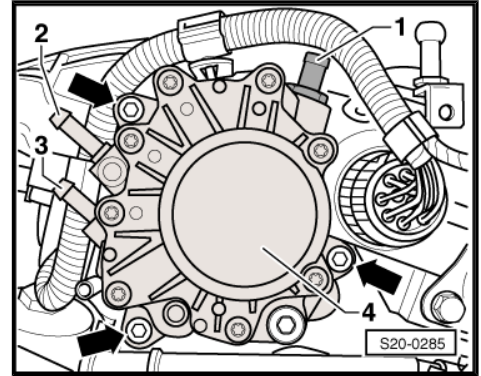
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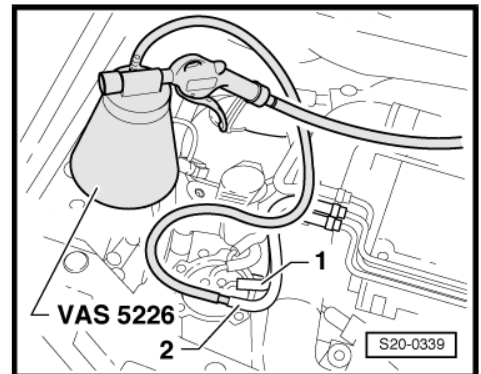
Note

- ♦ *Ensure that the coupling of the tandem pump is correctly seated in the camshaft.*
- ♦ *Always replace the tandem pump seals.*

- Install tandem pump and tighten the fixing screws -arrows- M8 to 20 Nm.



- Connect the fuel intake hose -1- (marked in white) to the fuel filter.
- Connect the diesel extractor - VAS 5226- to the return-flow hose -2-.
- Operate the diesel extractor - VAS 5226- until fuel comes out of the fuel return-flow hose.
- Connect fuel return-flow hose -2- (marked in blue) to fuel filter.



1.9 Inspecting a tandem pump

1.9.1 Checking the feed pressure of the tandem pump

Special tools and workshop equipment required

- ◆ Tester for tandem pump e.g. -VAS 5187- with hollow screw - VAS 5187/1A-
- ◆ Hose clamp - MP 7-602 (3094)-
- ◆ Pliers for spring-type clips

Test conditions

- The coolant temperature must be at least 85 °C.
- Unit injectors O.K.
- Fuel filter and fuel line must not be blocked.

Work procedure



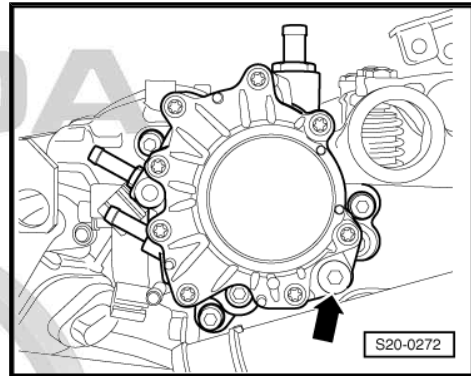
Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe rules for cleanliness* ⇒ [page 4](#).

- Remove engine cover ⇒ [page 13](#).
- Remove air filter with air mass meter - G70- ⇒ [page 148](#).



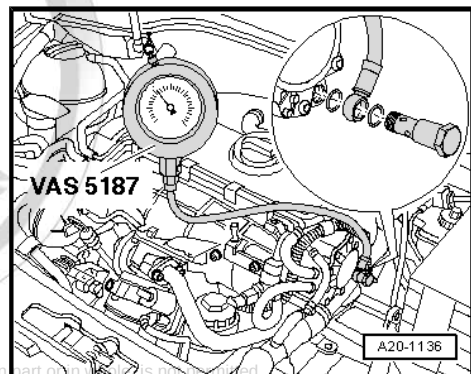
- Release screw plug -arrow-.



- Connect tester for tandem pump - VAS 5187- with hollow screw -VAS 5187/1A- as shown.
- Install air filter.
- Start engine and increase engine speed to 4000 rpm.
- Observe displayed pressure on the tester for tandem pump .
- Specified value: min. 1.05 MPa (10.5 bar).

If the measurement is less than the specification:

- Clamp fuel return-flow line between tandem pump and fuel filter with hose clamp - MP 7-602 - .
- Start engine and increase engine speed to 4000 rpm.
- Observe displayed pressure on the tester for tandem pump .
- Specified value: min. 1.05 MPa (10.5 bar).



If the specified value is reached:

- ◆ Pressure loss at the unit injectors.
- Replace O-rings for unit injectors ➔ [page 146](#) .

If the measurement is less than the specification:

- Replace tandem pump ➔ [page 113](#) .



Note

After removing the tester, tighten the screw plug to 25 Nm. Always replace the gasket ring.

1.9.2 Check tightness (internally) of tandem pump



Caution

- ◆ After re-installing a used tandem pump e.g. after changing or repairing a cylinder head and/or after changing a hopper motor the tandem pump must absolutely be checked for internal tightness between fuel and oil side.
- ◆ In case of leakage this can lead to a fuel/oil mixing, which can cause an engine damage.

Special tools and workshop equipment required

- ◆ Tester , e.g. -V.A.G 1687-

Work procedure

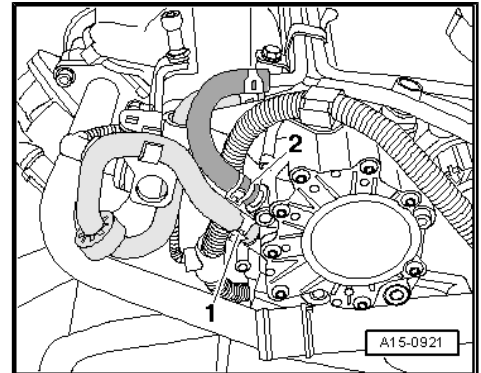


Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).
- ◆ *Observe rules for cleanliness* ⇒ [page 4](#).
- Remove engine cover ⇒ [page 13](#).
- Detach fuel intake hose -2- (marked in white) and fuel return-flow hose -1- (marked in blue) from the tandem pump.
- Close the return-flow connection at the tandem pump with a dummy plug. Secure the dummy plug with a spring strap clamp.

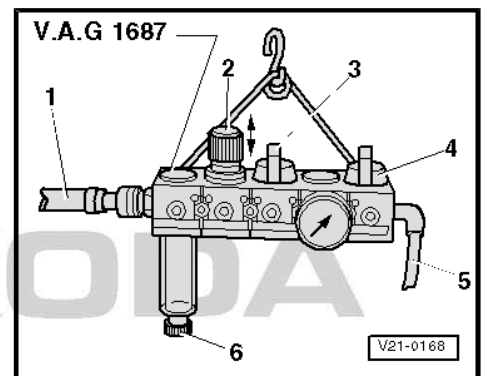
Prepare tester - V.A.G 1687- as follows:

- Unscrew pressure control valve -2- fully and close the valves -3- and -4-.
- Connect the testing device -5- with a commercially available connection for compressed air and a piece of fuel hose to the connection of the fuel feed line for the tandem pump. Secure hose with spring strap clip.



Note

The rotary knob must be pulled to the top in order to rotate the pressure control valve -2-.



- Connect the pneumatic hose -1- (pneumatic support) at tester.



Note

If there is water in the transparent drain container, drain water via the drain plug -6-.

- Open valve -3-.
- Set the pressure to 0,1 MPa (1,0 bar) with the pressure control valve -2-.



WARNING

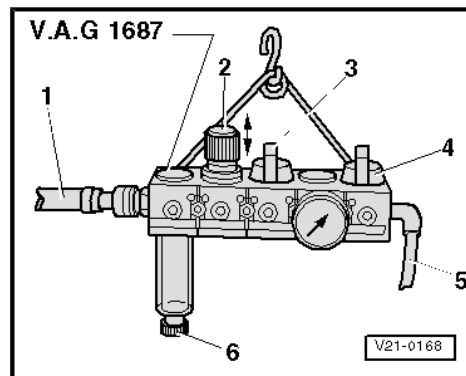
The maximum test pressure is 0.13 MPa (1.3 bar) and it must not be exceeded.



- Open valve -4- and wait until the test circuit is filled. If necessary, re-adjust the pressure to 0.1 MPa (1.0 bar).
- Close valve -3- to hold pressure and observe the pressure drop for 1 min.

If the pressure does not drop, the tandem pump can be used again.

If the pressure drops, the tandem pump must be replaced.



1.10 inspecting fuel pump

Special tools and workshop equipment required

- ◆ Remote control , e.g. -V.A.G 1348/3A-
- ◆ Auxiliary measuring set, , e. g. -V.A.G 1594 C-
- ◆ Adapter e.g. -V.A.G 1318/16-
- ◆ Adapter e.g. -V.A.G 1318/17-
- ◆ Measuring glass

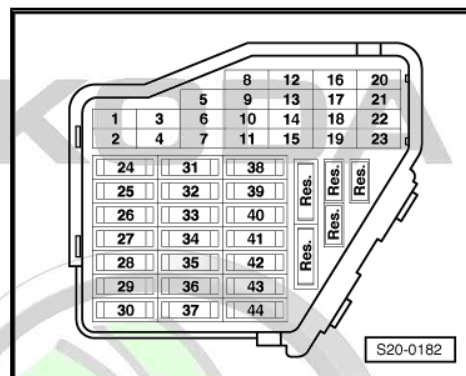
Checking the function and supply voltage

Test conditions

- Battery voltage at least 11.5 V
- Fuses OK (No. 27).
- All electrical consumers such as the lights and rear window heater must be switched off.

Test sequence

- Removing rear seat bench ➔ Body Work ➔ Rep. gr. 72 .



- Unclip retaining catches -arrows- of cover for the fuel delivery unit and remove cover.
- Switch on ignition.
 - The fuel pump must be heard to start running.
- Switch off ignition.

If the fuel pump does not run:

- Continuing searching for faults using a multimeter ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Check fuel flow rate

Test conditions

- Battery voltage at least 11.5 V
- Fuel temperature 15-30 °C.
- Fuel tank at least $\frac{1}{4}$ full.

Test sequence



Note

- ◆ *Safety precautions when working on the fuel supply system*
⇒ [page 3](#).

- ◆ *Observe rules for cleanliness* ⇒ [page 4](#).

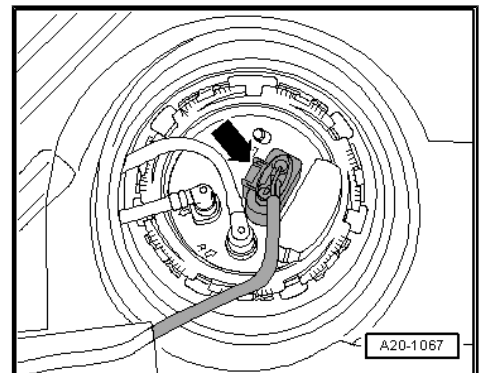
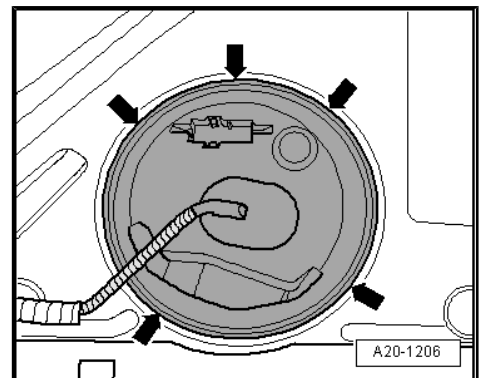
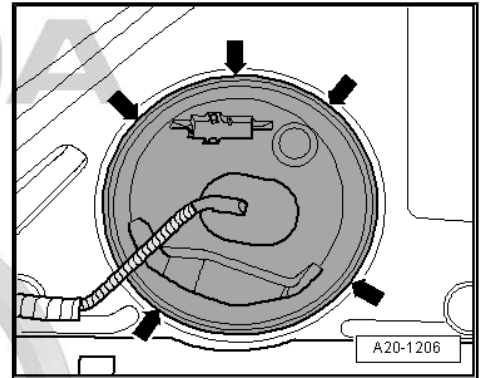
- Switch off ignition and pull out ignition key.
- Unscrew the cap from the filler neck.
- Removing rear seat bench ⇒ Body Work ⇒ Rep. gr. 72 .
- Unclip retaining catches -arrows- of cover for the fuel delivery unit and remove cover.



Note

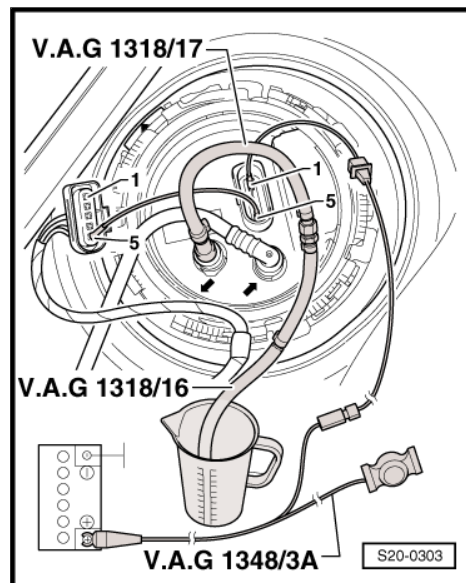
On vehicles with auxiliary heating, the plug connection for the dosing pump - V54- must also be disconnected.

- Unplug connector -arrow-.





- Connect remote control - V.A.G 1348/3A- with connection lines from measuring tool set to contact -1- of the fuel pump and to battery positive terminal.
- Use the connection lines from the measuring tool set to connect the contacts -5- to the plug and to the fuel delivery unit.
- Pull off the fuel feed line from the flange of the fuel delivery unit.
- Connect adapter - V.A.G 1318/17- and adapter - V.A.G 1318/16- , fit onto the feed support and hold in a measuring glass.
- Activate the remote control - V.A.G 1348/3A- for 30 seconds.
- Measure the battery voltage.



- Compare the fuel rate with the specified value.



Note

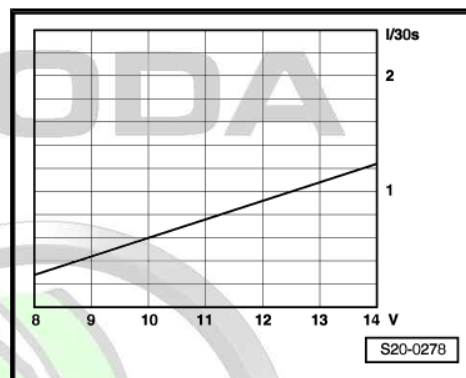
- ◆ The amount of the fuel pumped is dependent on the voltage.
- ◆ The diagram refers to the voltage which exists at the fuel pump.
- ◆ The voltage at the fuel pump is about 2 volts less than the battery voltage.

If the minimum fuel delivery volume is not reached:

- Remove the fuel delivery unit and check that the preliminary stage screen is not clogged up.

If no fault was detected until now:

- Replace fuel delivery unit.



2 Accelerator control

2.1 Assembly overview - accelerator module

1 - Connector

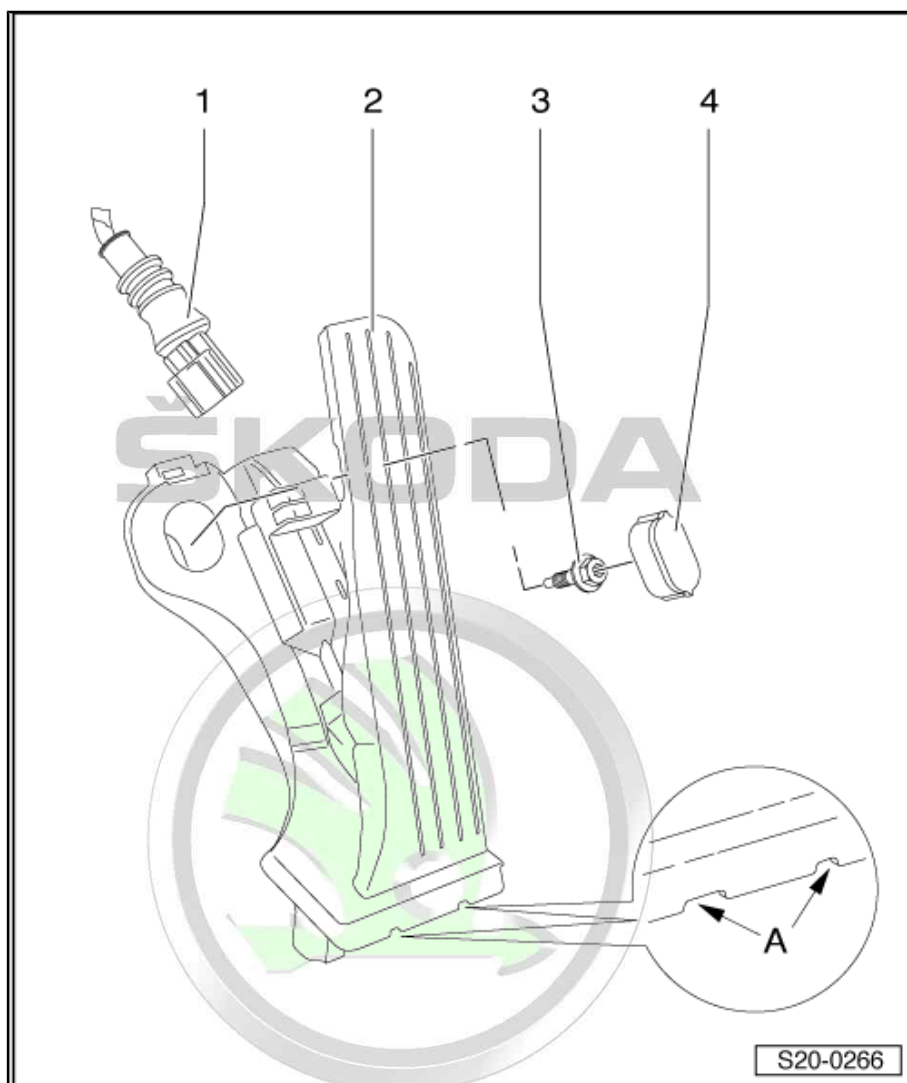
- ☐ black
- ☐ 6-pin

2 - Accelerator pedal module

- ☐ with accelerator pedal position encoder - G79- and accelerator pedal position encoder 2 - G185-
- ☐ -A- openings for release tool - T10238- or - T10240-
- ☐ not adjustable
- ☐ Removing and installing
⇒ [page 121](#)
- ☐ When replacing, adapt the engine control unit
⇒ Vehicle diagnostic tester

3 - 10 Nm

4 - Cap



2.2 Removing and installing accelerator pedal module

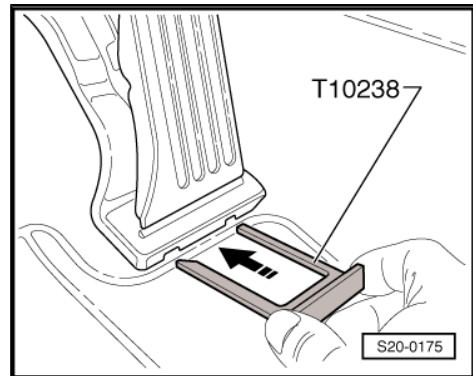
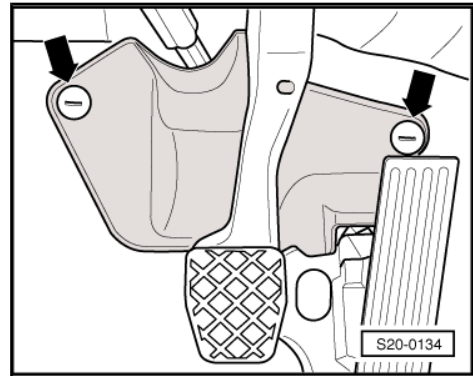
Special tools and workshop equipment required

- ◆ Release tool - T10238- (for left-hand drive vehicle)
- ◆ Release tool - T10240- (for right-hand drive vehicle)



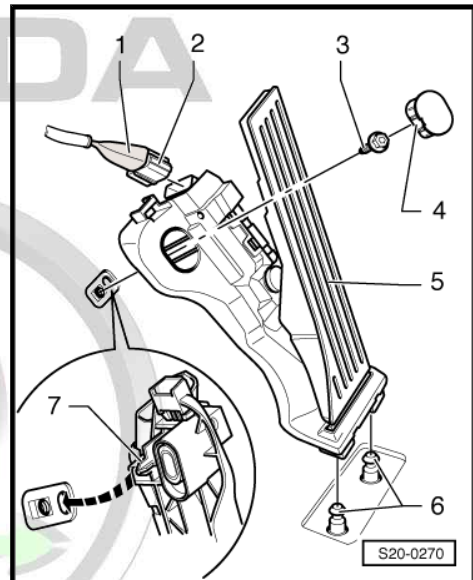
Removing

- Remove steering column trim panel -arrows-.
- Unscrew cap (➤ [page 121](#) , Pos. 4).
- Unscrew fixing screw (➤ [page 121](#) , Pos. 3).
- Push the release tool - T10238- (for right-hand drive release tool - T10240-) as shown up to the stop into the provided openings and remove the accelerator pedal module.
- Disconnect connector from accelerator pedal module. To do so press down securing element from connector.



Installing

- Fit the plug -2- onto the accelerator pedal module -5-. The locking of the connector must be audible.
- Push accelerator pedal module onto the securing bolt -6-.
- Insert the centering pin -7- into the hole in the underbody.
- Screw the accelerator pedal module with the fixing screw -3-, tighten to 10 Nm and fit on the cap -4-.
- Install steering column cover.
- If the accelerator pedal module was replaced, the engine control unit has to be adapted ➤ Vehicle diagnostic tester.



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21 – Turbocharging/supercharging

1 Charge air system with exhaust gas turbocharger



- ◆ Observe rules for cleanliness ➔ [page 4](#) .
- ◆ Secure all hose connections with corresponding hose clips.
- ◆ The charge-air system must be tight.
- ◆ Replace the gaskets, the sealing rings and the self-locking nuts.

1.1 Connection diagram for vacuum hoses

1 - Air filter housing

- ☐ With connection for ventilation line of the charge pressure control solenoid valve - N75-

2 - Solenoid valve for charge pressure control - N75-

3 - Cylinder head cover

- ☐ with vacuum unit

4 - Non-return valve

- ☐ Check fitting position

5 - Vacuum line to brake booster

6 - Changeover valve for radiator of exhaust gas recirculation - N345-

7 - Valve for intake manifold flap - N316-

8 - Vacuum setting element

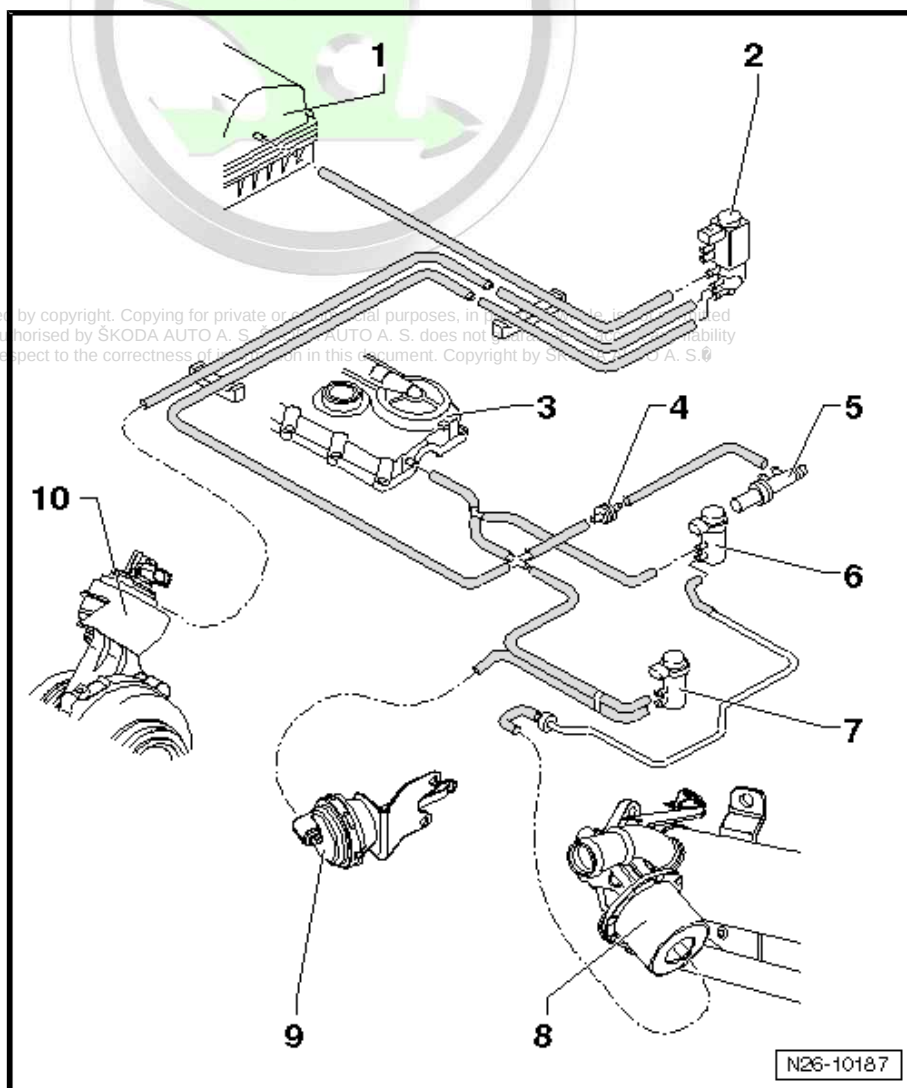
- ☐ for changeover of radiator for exhaust gas recirculation

9 - Vacuum setting element

- ☐ for airflow control

10 - Vacuum setting element

- ☐ at exhaust gas turbo-charger
- ☐ for position sender for charge pressure regulator - G581-





1.2 Removing and installing exhaust gas turbocharger

1 - 10 Nm

2 - Mounting bracket

3 - Heat shield

4 - Oil supply hose

- ☐ to connection fitting of oil feed line for exhaust gas turbocharger

5 - Exhaust gas turbocharger

- ☐ for position sender for charge pressure regulator - G581-
- ☐ always replace complete with exhaust manifold
- ☐ Removing ➤ [page 125](#)
- ☐ installing ➤ [page 128](#)

6 - Vacuum hose

- ☐ from charge pressure control solenoid valve - N75-

7 - Gasket

- ☐ replace
- ☐ Check fitting position

8 - for diesel particle filter

9 - Warm-type clamp - 7 Nm

- ☐ replace
- ☐ for exhaust gas turbocharger and diesel particle filter

10 - Exhaust manifold

- ☐ always replace complete with exhaust gas turbocharger

11 - 25 Nm

- ☐ replace

12 - Connecting pipe

- ☐ to radiator for exhaust gas recirculation

13 - Gasket

- ☐ replace

14 - 25 Nm

- ☐ replace

15 - 25 Nm

16 - 15 Nm

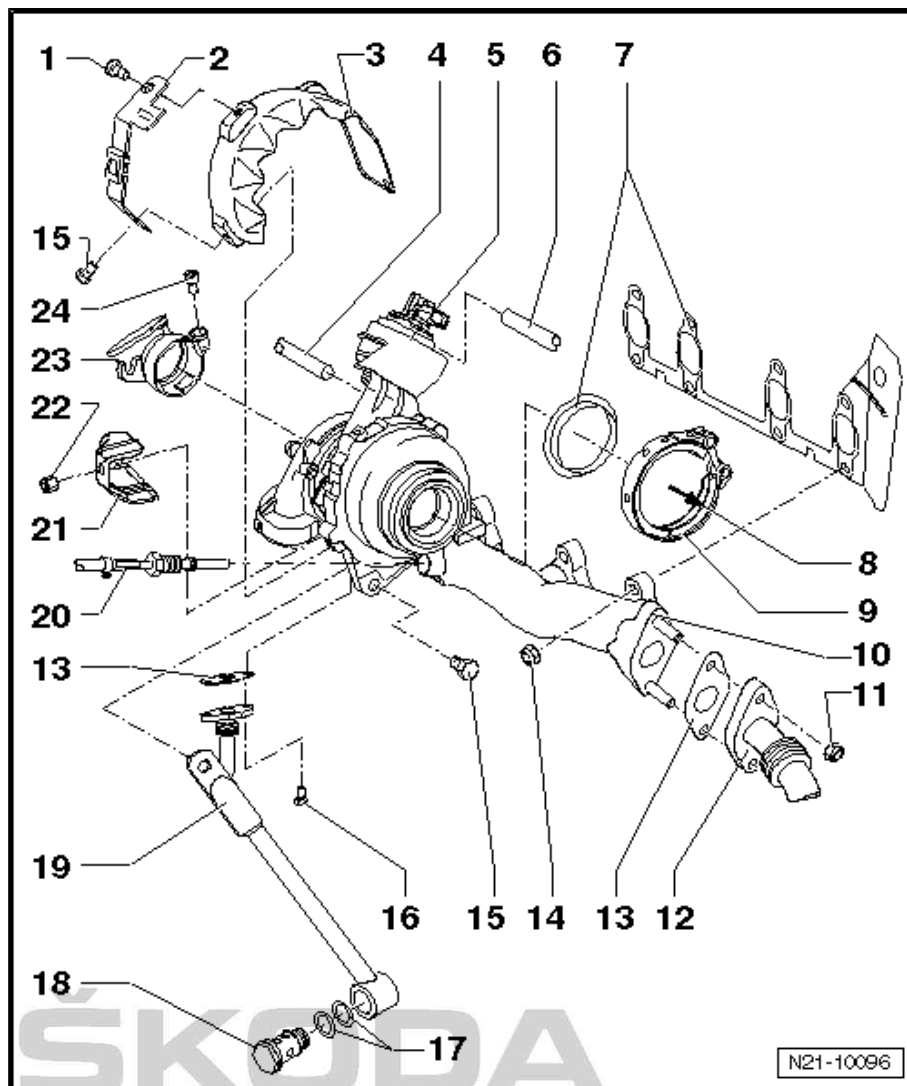
17 - O-ring

- ☐ replace

18 - Hollow screw - 60 Nm

19 - Countersupport

- ☐ for exhaust gas turbocharger



N21-10096



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- ☐ for oil return-flow line

20 - Exhaust gas temperature sender 1 - G235- (Temperature sender upstream of turbocharger - G507-)

- ☐ 45 Nm
- ☐ the thread of new temperature transmitters must be coated with assembly paste
- ☐ Grease only the thread with hot bolt paste - G 052 112 A3- for re-used temperature sender.

21 - Heat shield

22 - 25 Nm

- ☐ replace

23 - Connection fitting

- ☐ for intake hose of air filter

24 - 9 Nm

Special tools and workshop equipment required

- ◆ Pliers for spring-type clips



Caution

In case of mechanical damage to the exhaust gas turbocharger, e.g. damage of the compressor wheel, it is not sufficient to only replace the exhaust gas turbocharger. In order to prevent consequential damage to the engine, perform the following tasks:

- ◆ *Clean all oil lines.*
- ◆ *Change engine oil and oil filter.*
- ◆ *Check air filter housing, air filter element and charge air pipes as well as charge air hoses for soiling.*
- ◆ *Check all the air guides and the charge air cooler for foreign bodies.*

If foreign bodies are detected in the charge air system, the complete charge-air routing must be cleaned and if necessary the charge air cooler must also be replaced.

Removing



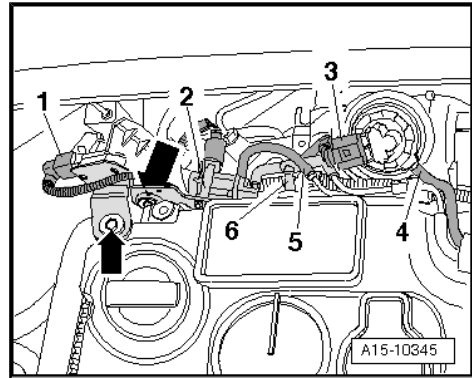
Note

Observe regulations concerning cleanliness when working on the exhaust gas turbocharger ⇒ [page 4](#) .

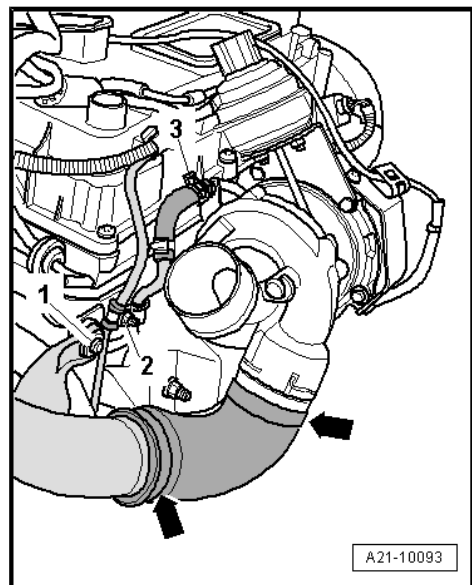
- Remove engine cover ⇒ [page 13](#) .
- Remove air filter with air mass meter - G70- and inlet hose ⇒ [page 148](#) .
- Unbolt heat shield for right drive shaft.
- Remove right drive shaft ⇒ Chassis ⇒ Rep. gr. 40 .
- Remove diesel particle filter ⇒ [page 154](#) .



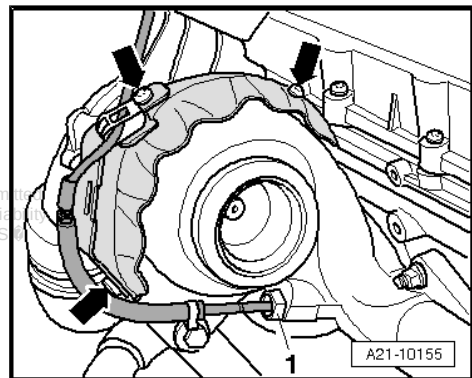
- Loosen change-over valve for exhaust gas recirculation radiator - N345- -2- at the bracket..
- Disconnect the connectors -1- and -3- and expose the electrical cables.
- Remove the vacuum line -4-.
- Unscrew screws -arrows-.



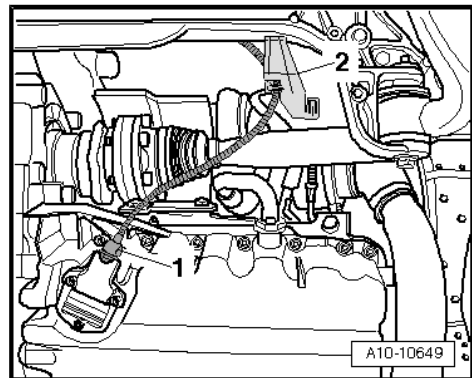
- Remove oil feed line -3- from the exhaust gas turbocharger.
- Undo retaining clips -arrow- and remove the charge air hose.



- Place the electric cable to exhaust gas temperature sender 1 - G235- (temperature sender upstream of turbocharger - G507-) -1- to one side.
- Release screws -arrows- and remove heat shield.

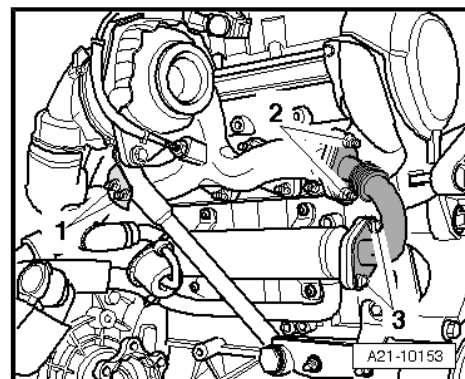


- Disconnect plug -1- from oil level and oil temperature sender - G266- and remove bracket -2- from assembly carrier.

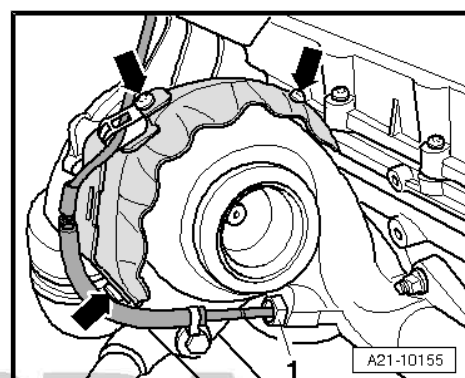


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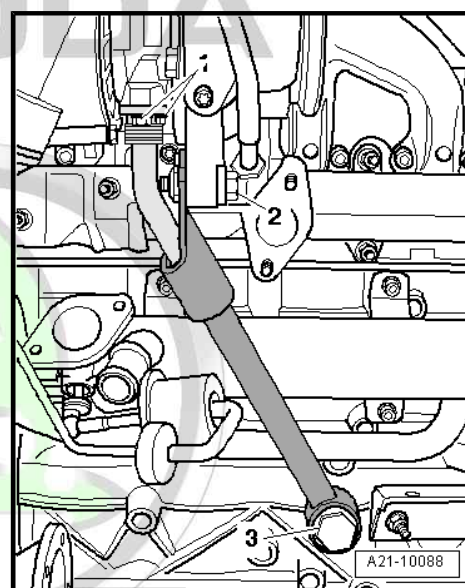
- Unscrew nuts -1- and remove heat shield to the left of exhaust manifold.
- Release nuts -2- and screws -3- and remove the connection pipe for exhaust gas recirculation.



- Disconnect plug connection for exhaust gas temperature sender 1 - G235- (temperature sender upstream of turbo-charger - G507-) and unscrew exhaust gas temperature sender 1 - G235- (temperature sender upstream of turbo-charger - G507-) -1- from the exhaust manifold.



- Unscrew screw -2- and hollow screw -3-.
- Rotate the turbocharger support 90° and pull it down and out of the oil return line.



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- Unscrew screws -arrows-.
- Remove exhaust gas turbocharger with exhaust manifold downwards. To do so, press the engine/gearbox assembly slightly forwards.

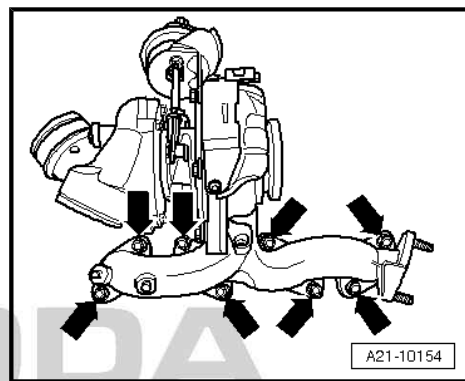
Installing

Installation occurs in reverse order to removal. Pay attention to the following:



Note

- ◆ *Replace the gaskets, the sealing rings and the self-locking nuts.*
- ◆ *Fill exhaust turbocharger with engine oil through the connection fitting of the oil feed line.*
- ◆ *Remove oil and grease from the charge air pipes and hoses and from their connections before installing.*
- ◆ *Secure all hose connections with corresponding hose clips.*
- Install exhaust system and align free of stress ⇒ [page 158](#) .
- Observe the assembly instruction for hose connections with push-fit couplings ⇒ [page 130](#) .
- Checking the oil level ⇒ Maintenance ; Booklet Octavia II .



Note

To ensure the oil supply to the exhaust gas turbocharger, leave the engine running for about 1 minute after installing the exhaust gas turbocharger.

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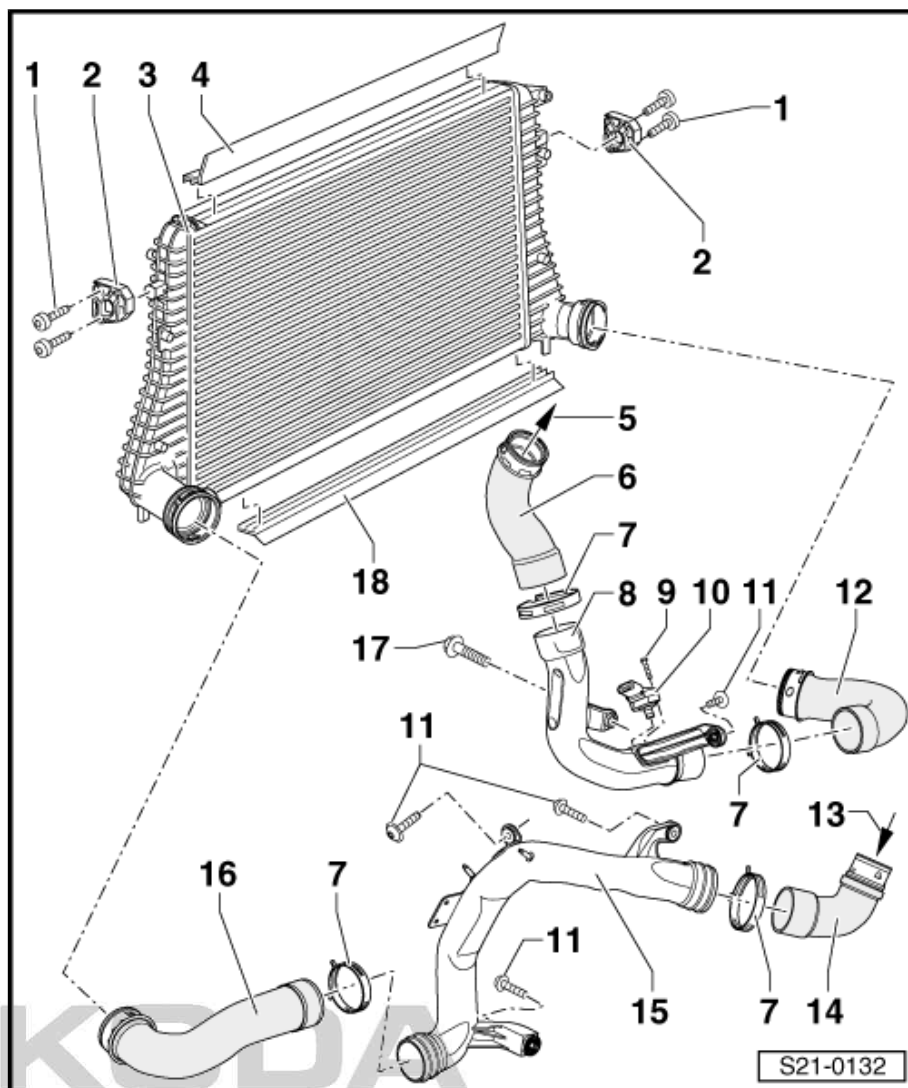
1.3 Summary of components - charge air cooler



Note

Observe general instructions for charge-air system ⇒ [page 5](#) .

- 1 - 5 Nm
- 2 - Mounting bracket
 - ☐ Check fitting position
- 3 - Charge air cooler
 - ☐ Removing and installing
⇒ [page 129](#)
- 4 - top seal
 - ☐ fitted onto charge air cooler
- 5 - To intake manifold
- 6 - Charge air hose
- 7 - Spring strap clamp
- 8 - Charge air pipe
- 9 - 3 Nm
- 10 - Charge pressure sender - G31- / intake air temperature sender - G42-
- 11 - 8 Nm
- 12 - Right charge air hose
- 13 - from exhaust turbocharger
- 14 - Charge air hose
- 15 - Charge air pipe
- 16 - Left charge air hose
- 17 - 15 Nm
- 18 - bottom seal
 - ☐ fitted onto charge air cooler



1.4 Removing and installing charge air cooler

Removing

- Remove coolant radiator ⇒ [page 99](#) .
- Remove front bumper ⇒ Body Work ⇒ Rep. gr. 63 .
- Remove the left charge air hose from the charge air cooler.
- Unscrew fixing screws on the charge air cooler
(⇒ [page 128](#) , Pos. 1).



WARNING

Do not open the refrigerant circuit of the air conditioning system.

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Caution

To avoid causing damage to the condenser and to the refrigerant lines and hoses make sure the lines and hoses are not over-extended, kinked or bent.



Note

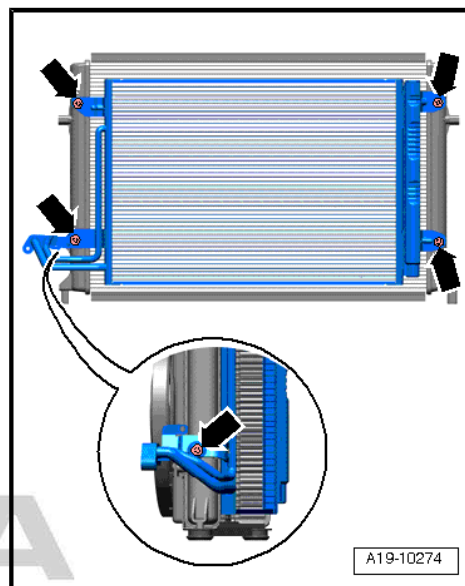
For the following operations a second mechanic is required to hold the charge air cooler.

- Swing charge air cooler backwards, remove brackets for charge air cooler at the sides and unhook from the lower bearings.
- Release the securing bolts -arrows- of the condenser.
- Remove charge air cooler downwards.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ♦ Observe the assembly instruction for hose connections with push-fit couplings ➔ [page 130](#) .



1.5 Hose connections with quick couplings



Caution

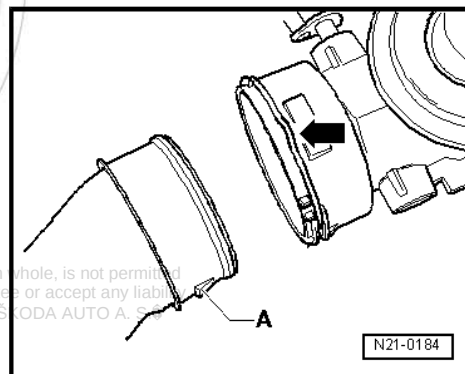
The gasket ring for the push-fit coupling can be damaged, if the locking clip is in the lock position during the assembly. The connection would leak. Observe the assembly instruction.

Removing

- Release push-fit coupling by pulling the locking clip -arrow-. Disconnect hose/pipe without auxiliary tool.

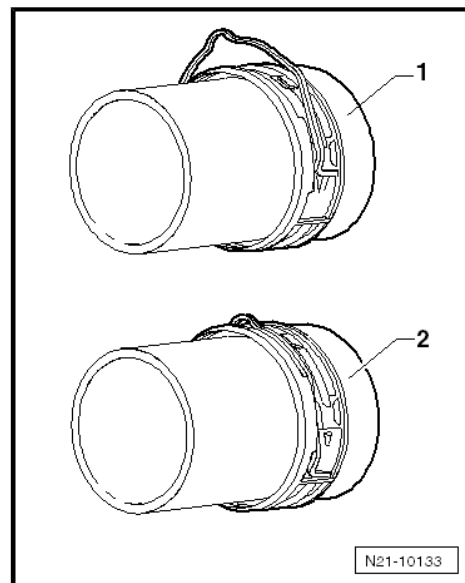
Installing

- When replacing the sealing ring, place the sealing ring in the groove of the charge air hose. Make sure that the gasket ring is fully seated all around in the groove and not twisted.
- Oil the sealing surface and the sealing ring.



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- Put the securing clamp into the release position -1-.
- Insert the charge air hose up to the stop into the coupling.
- Put the locking clip into the lock position -2- and then press down once again the charge air hose.
- Check hose for tight connection by pulling on it and check the quick coupling is locked correctly.



1.6 Checking the charge-air system for leak-tightness

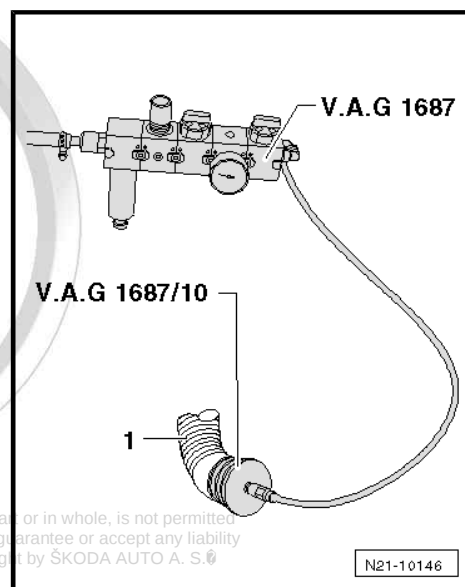
Special tools and workshop equipment required

- ◆ Charge-air system testing device , e. g. -V.A.G 1687-
- ◆ Adapter e.g. -V.A.G 1687/10-

Test sequence

- Remove intake hose -1- from air filter.
- Fit adapter - 1687/10- into the intake hose -1- and secure with a clamp.

Prepare tester for charge air system - V.A.G 1687- as follows:



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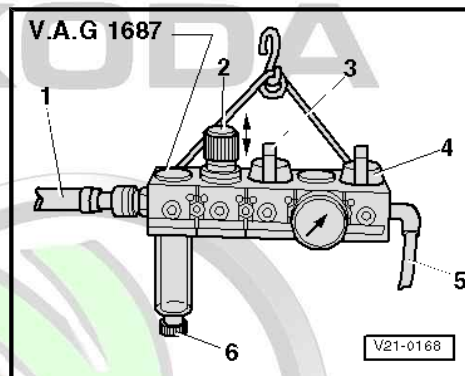


- Unscrew pressure control valve -2- fully and close the valves -3- and -4-.

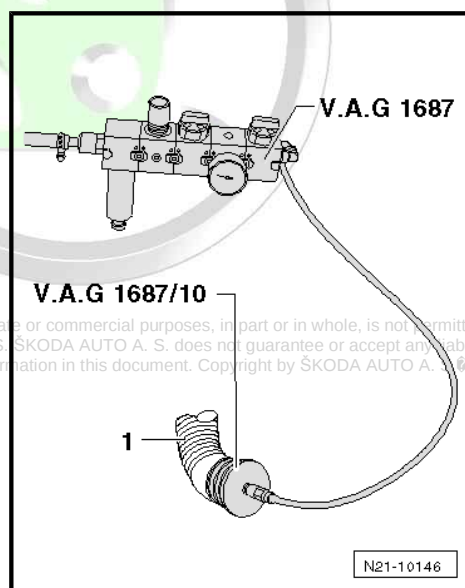


Note

The rotary knob must be pulled to the top in order to rotate the pressure control valve -2-.



- Connect tester - V.A.G 1687- as shown to adapter - 1687/10- .



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- Connect the pneumatic hose -1- (pneumatic support) at tester.



Note

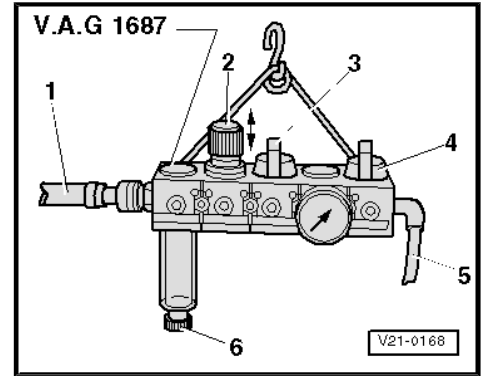
If there is water in the transparent drain container, drain water via the drain plug -6-.

- Open valve -3-.
- Set the pressure to 0.05 MPa (0.5 bar) with the pressure control valve -2-.



Caution

The pressure must not be greater than 0.05 MPa (0.5 bar)! A too high pressure can damage the engine.



- Open valve -4- and wait until the test circuit is filled. If necessary, re-adjust the pressure to 0.05 MPa (0.5 bar).
- Listen to, touch or use commercially available leak search spray or the ultrasonic measuring device e. g. -V.A.G 1842- to check the charge-air system with exhaust gas turbocharger for leak points.



Note

- ◆ *Minor leaks are permissible on the suction side of the turbo-charger, because the intake hoses are not designed for over-pressure.*
- ◆ *A small amount of air escapes via the valves into the engine. For this reason no pressure test is possible.*
- ◆ *Using the ultrasonic tester - V.A.G 1842- ⇒ Owner's Manual .*
- ◆ *In case of a leak point, observe the instructions for charge air system ⇒ [page 5](#) during the installation.*
- ◆ *Before removing the adapter, depressurize the test circuit by detaching the coupling from the adapter - 1687/10- .*



23 – Mixture preparation - injection

1 Repairing Diesel Direct Injection system

The control unit is equipped with event memory. Before repairs, setting operations and fault finding, query the event memory and run self-diagnosis ⇒ Vehicle diagnostic tester.



Note

- ◆ *Faults can be detected by the control unit as checking and adjustment work is being undertaken and then saved. It is therefore essential to always delete the event memory after completing all checking and adjustment work ⇒ Vehicle diagnostic tester.*
- ◆ *Observe the safety precautions when working on the diesel direct injection system ⇒ [page 3](#).*



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1.1 Installation location overview

1 - Exhaust gas pressure sensor 1 - G450-

2 - lambda probe - G39- with heating for lambda probe - Z19-

3 - Diesel direct injection system control unit - J248-

- ☐ with altitude sender - F96-
- ☐ Removing and installing ⇒ [page 151](#)

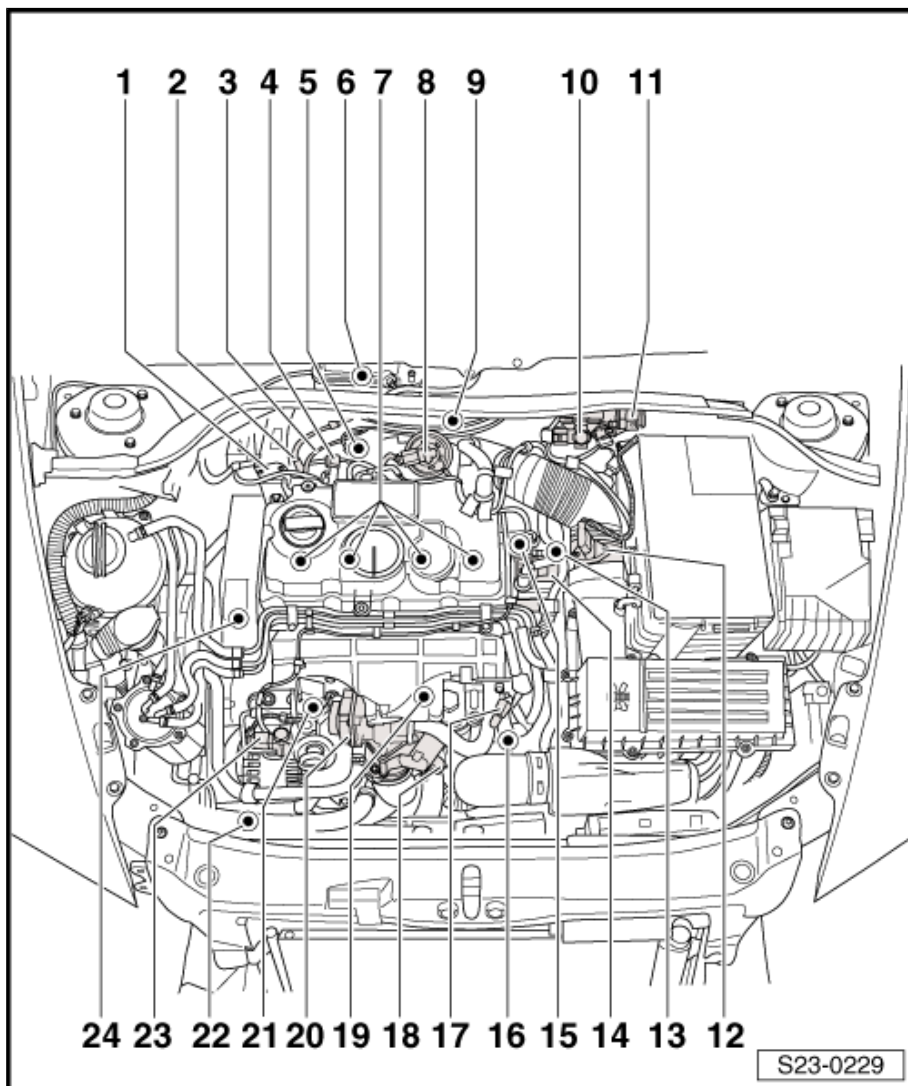
4 - Exhaust gas temperature sender 3 - G495- (Temperature sender downstream particle filter - G527-)

5 - Changeover valve for radiator of exhaust gas recirculation - N345-

6 - Exhaust gas temperature sender 2 - G448- (Temperature sender upstream particle filter - G506-)

7 - Unit injectors and ceramic glow plugs

- ☐ Valve for pump nozzle of cylinder 1 - N240-
- ☐ Valve for pump nozzle of cylinder 2 - N241-
- ☐ Valve for pump nozzle of cylinder 3 - N242-
- ☐ Valve for pump nozzle of cylinder 4 - N243-
- ☐ Removing and installing



unit injectors

⇒ [page 141](#)

- ☐ Glow plug 1 - Q10-
- ☐ Glow plug 2 - Q11-
- ☐ Glow plug 3 - Q12-
- ☐ Glow plug 4 - Q13-
- ☐ Removing and installing ceramic glow plugs ⇒ [page 166](#) .

8 - Position transmitter for charge pressure regulator - G581-

9 - Exhaust gas temperature sender 1 - G235- (Temperature sender upstream of turbocharger - G507-)

10 - Solenoid valve for charge pressure control - N75-

11 - Connector

- ☐ left at the bulkhead plenum chamber
- ☐ Summary of components ⇒ [page 136](#)

12 - Air mass meter - G70-

13 - Coolant temperature sender - G62-

14 - Tandem pump

15 - Multipin plug connection

- ☐ Central plug connection for unit injectors and ceramic glow plugs

16 - engine speed sender - G28-

- ☐ Removing and installing ⇒ [page 149](#)

17 - Fuel temperature sender - G81-

18 - Intake manifold flap motor - V157-

19 - 3-pin connector

- ☐ for Hall sender - G40-

20 - Exhaust gas return valve - N18-

- ☐ consists of:

- ◆ mechanical valve (electrically operated)
- ◆ Exhaust gas recirculation control motor - V338-
- ◆ Exhaust gas recirculation potentiometer - G212-

21 - Coolant temperature sender at radiator outlet - G83-

22 - Charge pressure sender - G31- with intake air temperature sender - G42-

23 - Valve for intake manifold flap - N316-

24 - Hall sender - G40-

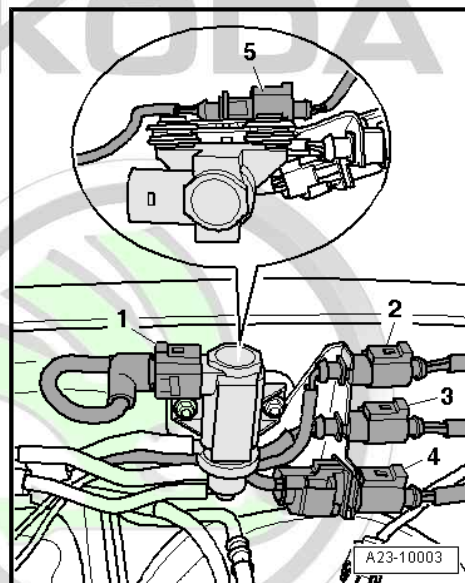
- ☐ for camshaft position

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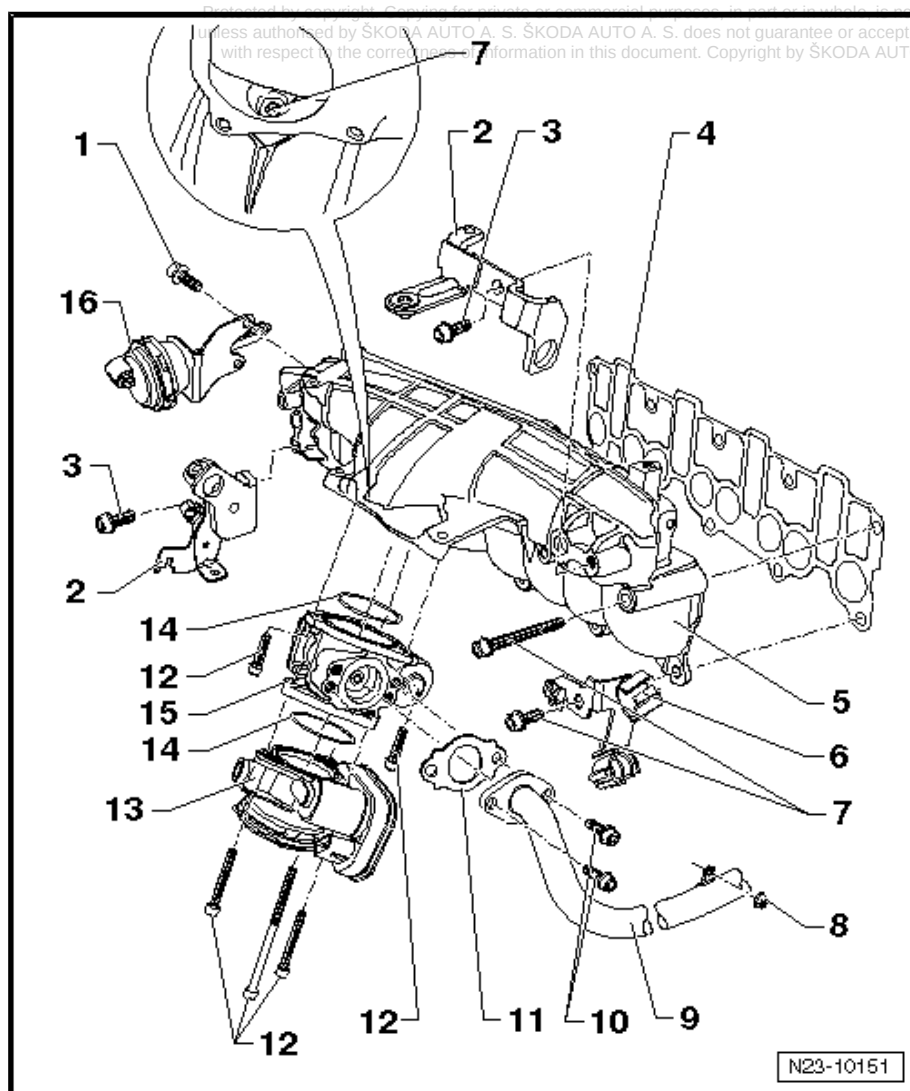
Plug on the bulkhead plenum chamber - assembly overview

- 1 - Connector (black) for solenoid valve for charge pressure control - N75-
- 2 - Plug (orange) for exhaust gas temperature sender 3 - G495- (temperature sender downstream particle filter - G527-)
- 3 - Plug (black) for exhaust gas temperature sender 1 - G235- (temperature sender upstream of turbocharger - G507-)
- 4 - Plug (black) for lambda probe - G39- with heating for lambda probe - Z19-
- 5 - Plug (brown) for exhaust gas temperature sender 2 - G448- (temperature sender upstream of particle filter - G506-)



1.2 Intake manifold with component parts - Summary of components

- 1 - 10 Nm
- 2 - Mounting bracket
- 3 - 22 Nm
- 4 - Gasket
 - ☐ replace
- 5 - Intake manifold
 - ☐ with airflow control
- 6 - Mounting bracket
 - ☐ for wiring loom
- 7 - 22 Nm
- 8 - 10 Nm
- 9 - Connecting pipe
 - ☐ to radiator for exhaust gas recirculation
- 10 - 22 Nm
- 11 - Gasket
 - ☐ replace
- 12 - 10 Nm
- 13 - Intake manifold flap motor - V157-
 - ☐ The intake manifold flap is closed for about 3 seconds after switching off the engine and then opens again. This reduces the switch-off impact.
- 14 - O-ring
 - ☐ replace



15 - Exhaust gas return valve - N18-

- ☐ consists of:
- ◆ mechanical valve (electrically operated)
- ◆ Exhaust gas recirculation control motor - V338-
- ◆ Exhaust gas recirculation potentiometer - G212-

16 - Vacuum setting element

- ☐ for airflow control

1.3 Wiring harness for unit injectors and ceramic glow plugs - summary of components

1 - Plug for ceramic glow plugs

2 - Stainless steel clamps

- ☐ do not bend

3 - Fixing screw

- ☐ tighten to 10 Nm

4 - Reduction Ring

- ☐ note the correct installation position when installing ➔ [page 137](#)

5 - Central plug connection

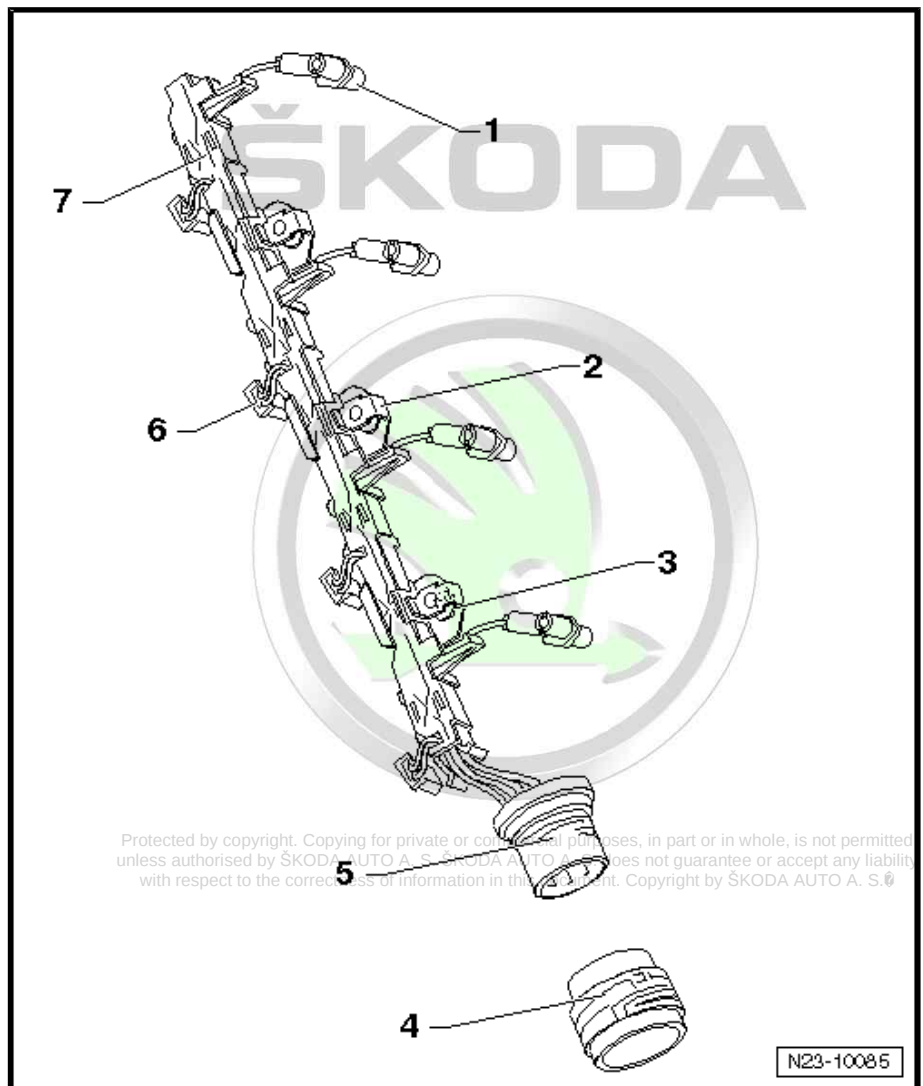
- ☐ note the correct installation position when installing ➔ [page 137](#)

6 - Connector

- ☐ 2-pin
- ☐ for unit injector

7 - Cable guide

- ☐ only remove and install with stainless steel clamps (Pos. 2)



1.4 Removing and installing the wiring harness for unit injectors and ceramic glow plugs

Special tools and workshop equipment required

- ◆ Extractor - T10312-



◆ Key - T10310-

Removing



Caution

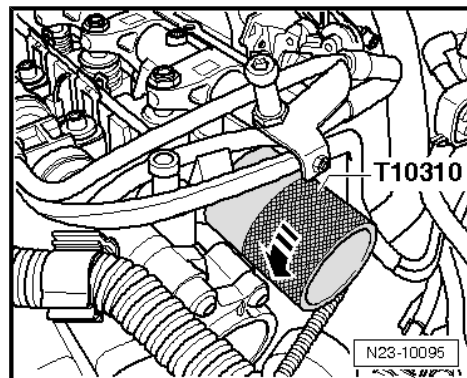
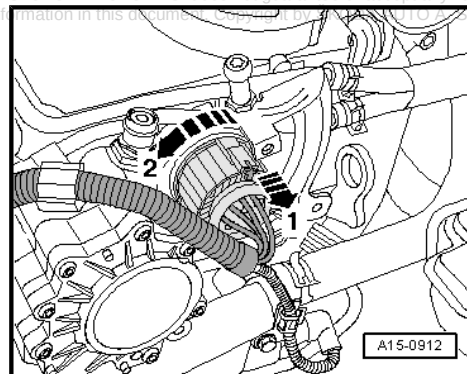
The installation / removal of the wiring harness must only be carried out by unscrewing/screwing on the clamps. By removing the cable guide from the clamps, the clamps will be bent apart and the larger clearance can lead to cable breakage. This applies both to the replacement of the unit injectors and to all work that does not require complete removal of the wiring harness.



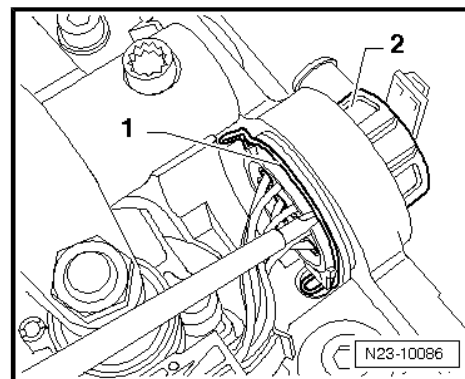
Note

For piezoelectric unit injectors, the connector must only be removed using special tool extractor - T10312-.

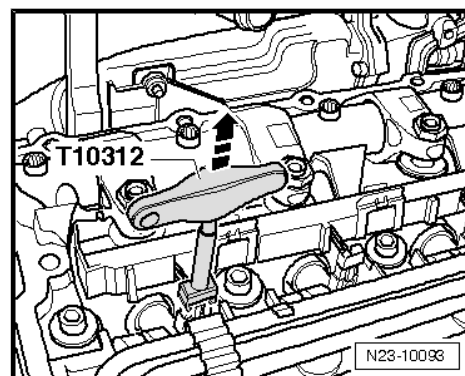
- Switch off ignition and pull out ignition key.
- Remove cylinder head cover ➤ [page 55](#).
- Disconnect central plug connection on cylinder head. To do so, pull the release mandrel in -arrow direction 1- and open the knurled nut in -arrow direction 2-.
- Place key - T10310- on the reduction ring and release the ring with a torquing angle of 90 ° (1/4 turn) in the -arrow direction-.



- Slightly raise the safety clamp -1- with a screwdriver and push through the central plug connection -2- towards the inside.



- Slide the extractor - T10312- laterally onto the connectors of the unit injectors and remove in the -direction of the arrow-.

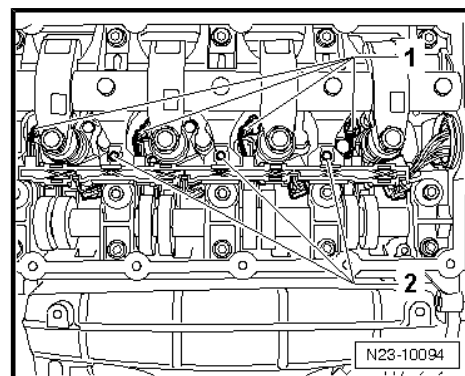


- Unplug connector -1- from the ceramic glow plugs. Fixing screws -2-, unscrew the stainless steel clamps and remove the entire wiring harness.

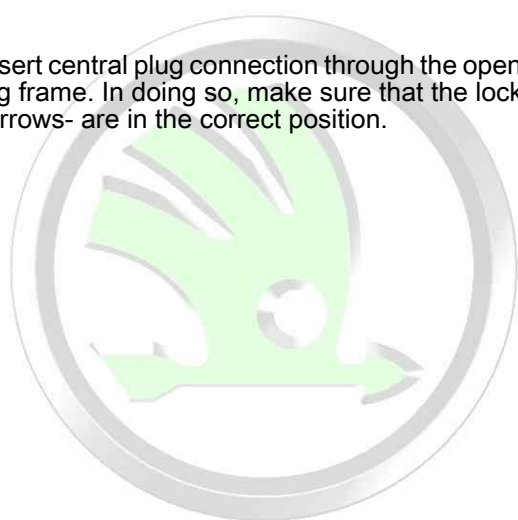
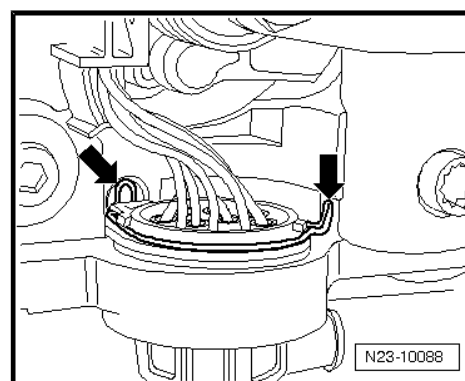
Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Expose wiring harness and tighten fixing screws to 10 Nm.

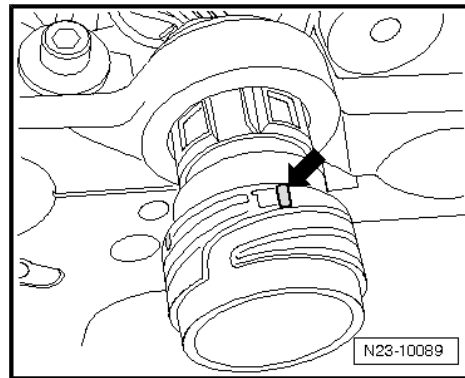


- Insert central plug connection through the opening in the bearing frame. In doing so, make sure that the locking clips -arrows- are in the correct position.





- Position the reduction ring (colour-coded “long” lug -arrow- is in the 12 o'clock position).



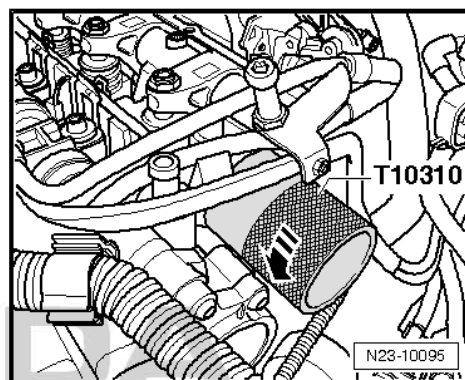
- Place key - T10310- on the reduction ring and secure the ring with a torquing angle of 90 ° (1/4 turn) in the opposite direction to the -arrow direction-.



Note

After correct installation of the reduction ring, the colour-coded “short” lug is in the 12 o'clock position.

- Place central plug connection on cylinder head and lock.
- Install cylinder head cover ➔ [page 55](#) .



1.5 Unit injectors - Summary of components



Note

Observe rules for cleanliness ➔ [page 4](#) .



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1 - 3 Nm + torque a further 270°
(³/₄ turn)

☐ replace



Note

Further torquing angle 270° must be carried out in one go!

2 - Valve-lever shaft

☐ Removing and installing
⇒ [page 141](#)

3 - 20 Nm + torque a further 90°
(¹/₄ turn)

☐ replace

4 - Adjusting screw

☐ replace
☐ Grease the contact surface to the ball stud of the unit injector using grease - G 000 100- .

5 - Lock nut - 30 Nm

6 - The unit injector

☐ Removing and installing
⇒ [page 141](#)
☐ Use extractor - T10312- to remove the connector.
☐ When installing, grease O-rings and pipes in cylinder head

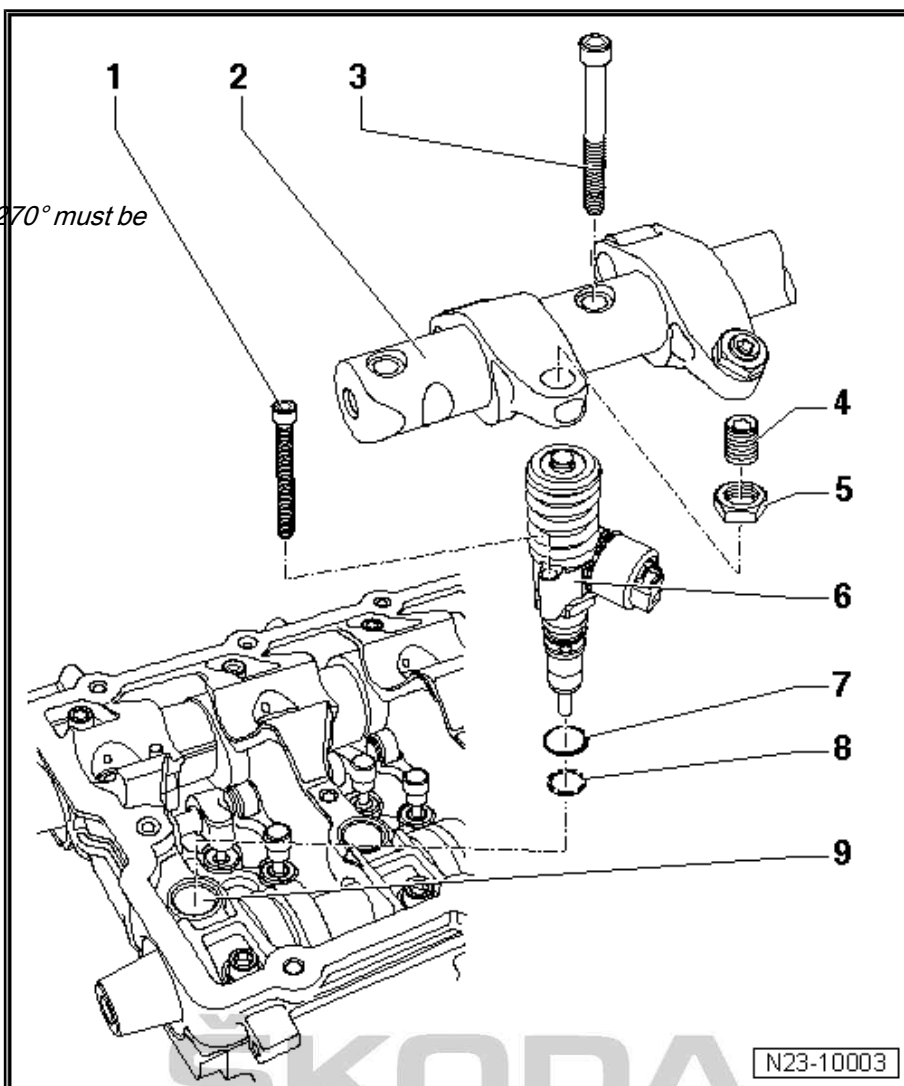
7 - O-ring

☐ Replace ⇒ [page 146](#)

8 - O-ring

☐ Replace ⇒ [page 146](#)

9 - Cylinder head



1.6 Removing and installing unit injectors

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - MP 3-447 (VW 387)-
- ◆ Valve lever - MP1-211 (VW 541/1A)-
- ◆ Valve assembly device - MP1-213 (2036)-
- ◆ Retaining plate - MP1-213/1 (2036/1)-
- ◆ Extractor - T10133/3-
- ◆ Extractor - T10163-
- ◆ Extractor - T10312-
- ◆ Plug insert - T10054- (XZN 6, total length at least 75 mm)
- ◆ Dial gauge
- ◆ Counterholder - T10172 - or -MP 1-216-

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1.6.1 Removing

- Switch off ignition and pull out ignition key.
- Remove cylinder head cover ➔ [page 55](#) .
- Undo the locknuts -2- of the adjusting screws -1- for all unit injectors and unscrew adjusting screws until the respective valve lever is resting on the spring plate of the unit injector.



Note

Do not remove the screws from the valve lever shaft in order that the individual parts remain attached to the valve lever shaft. Mark the assignment of the valve lever if necessary.

- Remove screws -1-, -3- and -5-.
- Undo screws -2- and -4- and alternately remove in several stages, and remove valve lever shaft.

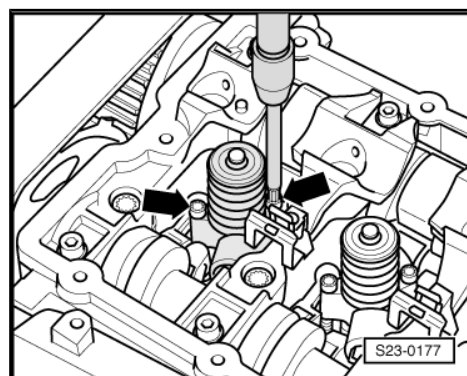
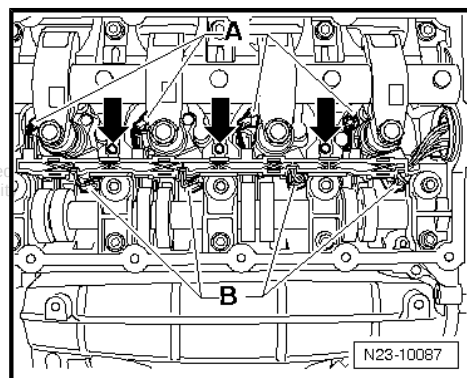
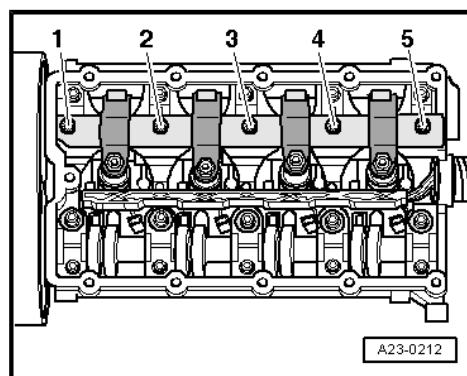
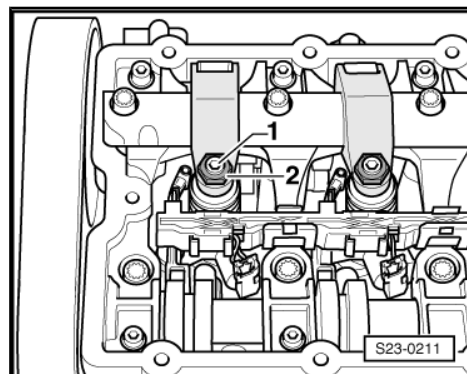
- Remove connector -A- from the ceramic glow plugs.
- Remove connector -B- from the unit injectors using the extractor - T10312- ➔ [page 139](#) .



Caution

To remove and install the unit injectors, the screws for retaining clips must be loosened or tightened if necessary. If the wiring harness is removed from the retaining clips, the clips will be bent apart and the increased play can lead to a cable break.

- Unscrew screws -arrows- on the retaining clips and place the entire wiring harness to one side.
- Unscrew screws -arrows- with plug insert - T10054- and remove from the holes.



- Always pull the ball studs -1- out of the respective unit injector.

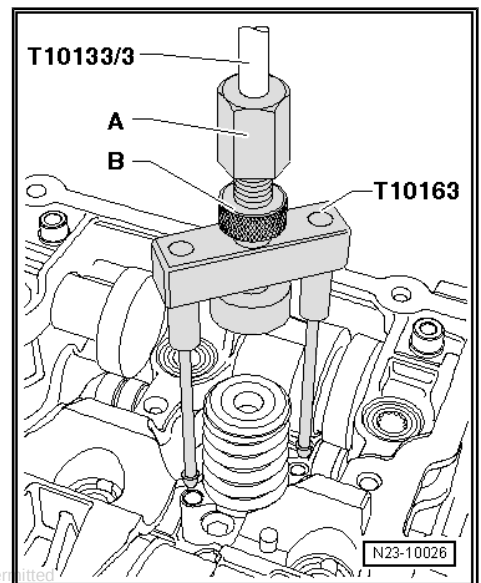
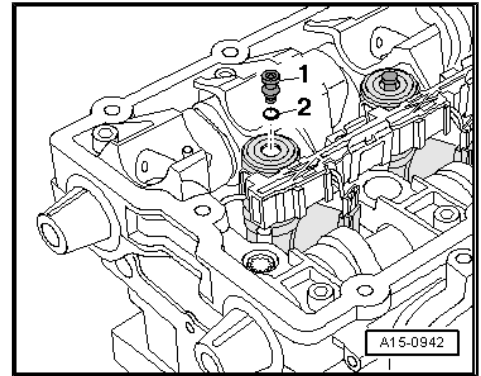
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- Insert the extractor - T10163- into the holes for screws on the unit injector.
- Moderately tighten the spindle -A- to the unit injector. Tighten lock nut -B- by hand.
- Carefully knock on the extractor - T10133/3- to remove the unit injector from the cylinder head seat.



Note

Do not interchange the unit injectors, if necessary mark the assignment to each cylinder.



1.6.2 Installing



Caution

- *For any work requiring adjustment of the unit injector using the adjusting screw, the adjusting screw in the valve lever and the ball stud in the unit injector will need to be replaced; otherwise these components will be significantly worn.*
- *Fixing screws for unit injectors will also need to be replaced.*



Note

- ◆ *When installing, grease O-rings and pipes in cylinder head*
- ◆ *New unit injectors are supplied with new O-rings.*
- ◆ *If the old unit injectors are reinstalled, replace the O-rings ➔ [page 146](#) ,*
- ◆ *Grease the contact surfaces between the ball stud and the adjusting screw using grease - G 000 100- .*
- Before installing the unit injector, check the two O-rings for correct position.
- The O-rings must not be twisted.



- The O-ring with the white marking is fitted in the lower groove of the unit injector.
- Moisten the O-rings and valve stem of the unit injector with oil.
- Check that the seat of the unit injector in the cylinder head is not contaminated by foreign bodies (chips, carbon deposits etc.), and clean with compressed air if necessary.
- Carefully insert the unit injector into the cylinder head.
- Place the assembly device for valves - 2036- with retaining plates - 2036/1- onto the bearing frame of the cylinder head as shown.



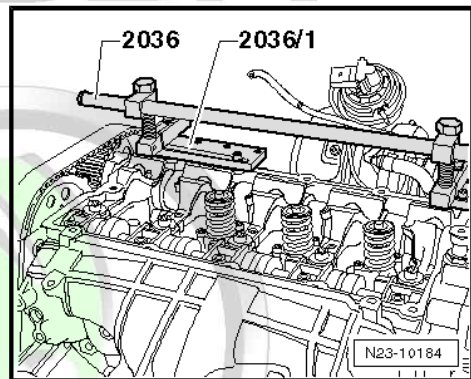
Note

If the retaining plates - 2036/1- cannot be removed because of the radiator for exhaust gas recirculation, use a large bodywork construction system.

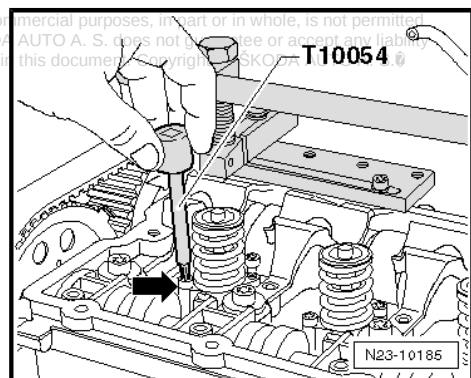


Caution

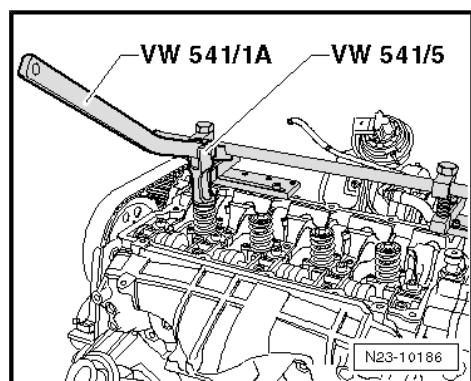
If the unit injector is pulled downwards by the fixing screws, there is a risk of the unit injector being drawn into the seat at an angle. This could lead to driving behaviour errors and starting difficulties. Therefore, the unit injector must only be screwed on once it has been pressed into its seat.



- Insert new fixing screws and carefully screw in without a lot of force using the plug insert - T10054- as far as the stop -arrow-.



- Position the valve lever - VW 541/1 A- with thrust piece - VW 541/5- .
- Carefully press the unit injector with valve lever into the seat and hold with the same force.
- Carefully screw in the fixing screws of the unit injector without a lot of force as far as the stop.



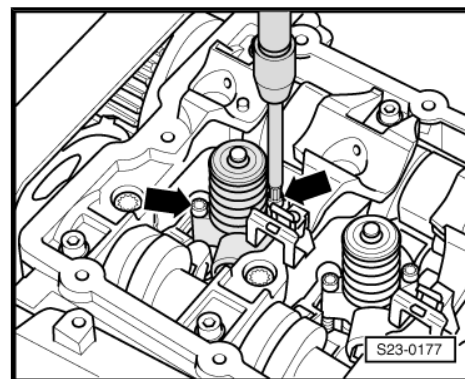
- Alternately tighten the unit injector screws -arrows- using plug insert - T10054- as follows:

Stage	Apply
I	– Tighten with the torque wrench to 3 Nm.
II	– Using a rigid wrench torque a further 270° ($\frac{3}{4}$ turn).



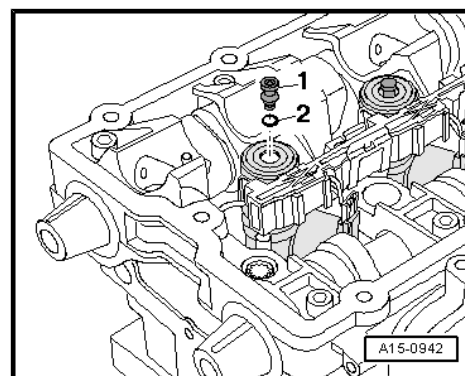
Note

Further torquing angle 270° must be carried out in one go!



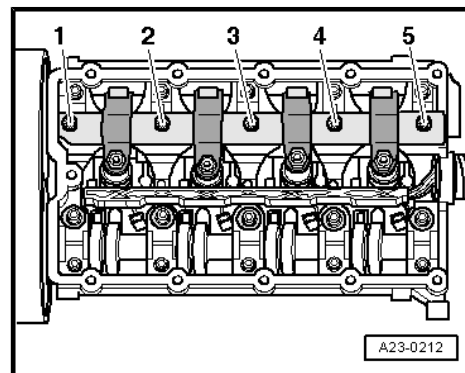
- Before inserting the valve-lever shaft, check that all ball studs -1- and O-rings -2- have been inserted in the unit injectors.

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- Screw on the valve-lever shaft with new screws as follows:

Se-quence	Apply
I	– Alternately tighten screws -2- and -4- in stages until the valve-lever shaft is resting on the bearing frame.
II	– Tighten screws -1-, -3- and -5- to 20 Nm + torque a further 90° ($\frac{1}{4}$ turn).
III	– Tighten screws -2- and -4- to 20 Nm + torque a further 90° ($\frac{1}{4}$ turn).



- Replace the adjusting screws and the ball stud of the unit injector (except for the new unit injectors).

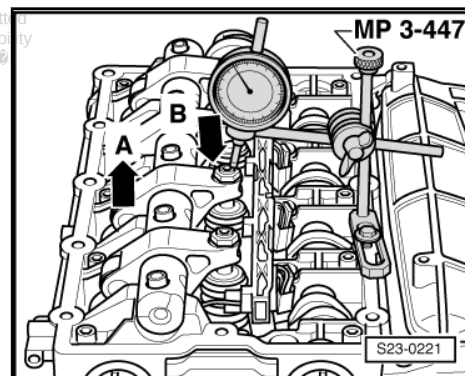
- Place a dial gauge on the adjusting screw of the unit injector.



Caution

The engine may only be turned in the direction of engine rotation (clockwise) at the crankshaft.

- Turn the crankshaft in the running direction of the engine until the roller of the valve lever is on the drive cam tip.
- Valve lever roller side -arrow A- is at the highest point.
- Dial gauge -arrow B- is at the lowest point.
- Remove the dial gauge.
- Turn the adjusting screw into the valve lever until clear resistance can be felt (the unit injector is at the stop).

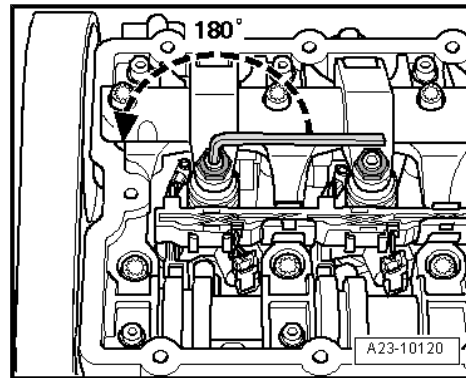




- Turn the adjusting screw in the opposite direction from the stop by about 180°
- Firmly hold the adjusting screw in this position and tighten the locknut to 30 Nm.

Further installation occurs in reverse order to removal. Pay attention to the following:

- Connect the plug connections for unit injectors and ceramic glow plugs.
- Attach retaining clips.
- Install cylinder head cover ⇒ [page 55](#) .



1.7 Replacing O-rings for unit injectors.

Special tools and workshop equipment required

- ◆ Assembly sleeve - T10308/1-
- ◆ Assembly sleeve - T10308/2-

Removing

- Remove the unit injector ⇒ [page 141](#) .
- Lever off the old O-rings from the unit injector with extreme care.

Make sure that no burr arises at the base of the O-rings.

Installing

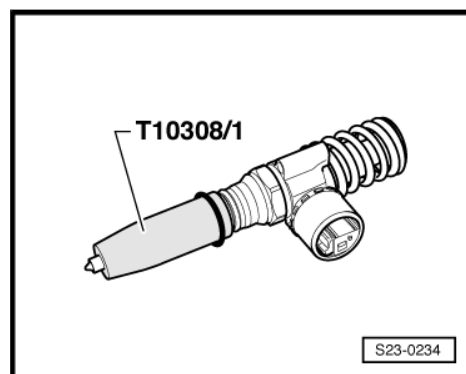


Note

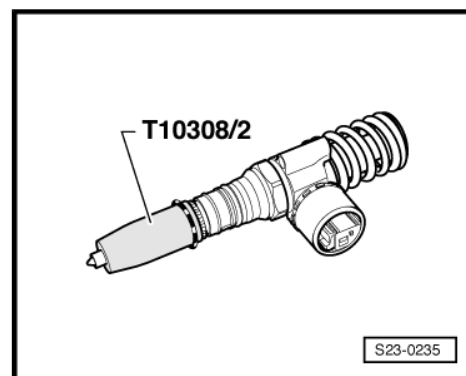
- ◆ *Always use the assembly sleeves to install the O-rings. If not used, the O-rings may be damaged.*
- ◆ *Pay attention to the correct assignment of the O-rings to the grooves.*
- ◆ *Slide on the O-rings during assembly, do not roll. The O-rings must not be twisted in the seat of the unit injector.*

- Clean the contact surfaces for the O-rings in the unit injector with great care.
- Insert the assembly sleeve - T10308/1- on the unit injector up to the stop.
- Carefully slide the top, thicker O-ring onto the assembly sleeve and into the groove on the unit injector.
- Remove assembly sleeve.

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- Insert the assembly sleeve - T10308/2- on the unit injector up to the stop.
- Carefully slide the lower O-ring with white marking onto the assembly sleeve and into the groove on the unit injector.
- Remove assembly sleeve.
- Install the unit injector ➤ [page 141](#) .



1.8 Summary of components - air filter

Removing and installing air filter ➤ [page 148](#) .

1 - intake hose

- ☐ to exhaust gas turbo-charger

2 - Air mass meter - G70- - G70-

3 - O-ring

- ☐ Replace if damaged.

4 - Vacuum hose

- ☐ To the solenoid valve for charge pressure limitation - N75-

5 - 2 Nm

6 - Air filter top part

- ☐ if during repairs the air filter housing is opened (except for air filter element change), it should be entered in the Service Schedule (change interval for air filter element is shortened)

7 - Air intake

- ☐ screwed onto lock carrier

8 - 2 Nm

9 - Air intake hose

10 - Drain pipe

11 - Air filter bottom part

- ☐ with supports for drain pipe

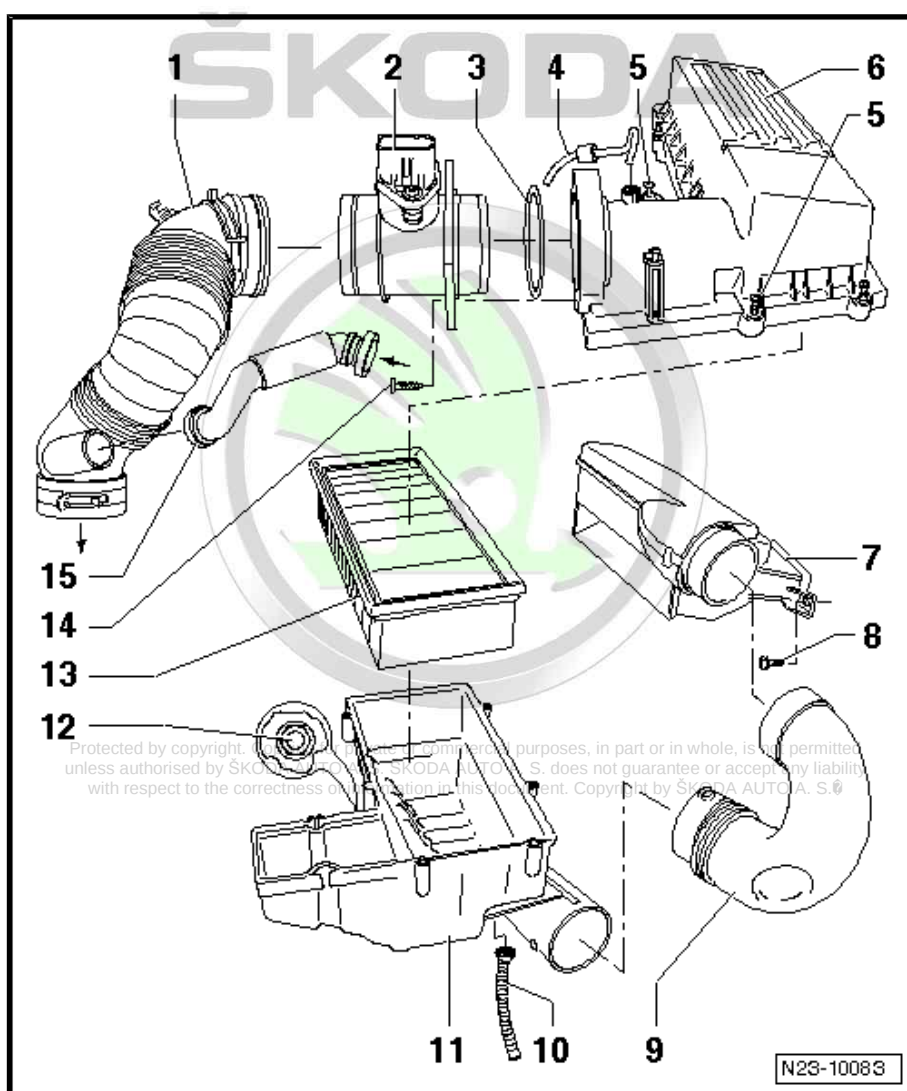
12 - 8 Nm

13 - Air filter element

14 - 2 Nm

15 - Connecting pipe

- ☐ from cylinder head cover
- ☐ for crankcase ventilation



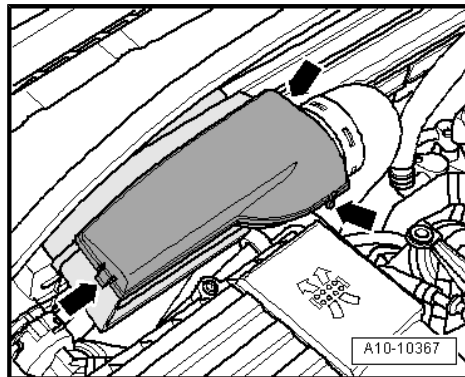
1.9 Removing and installing air filter

Special tools and workshop equipment required

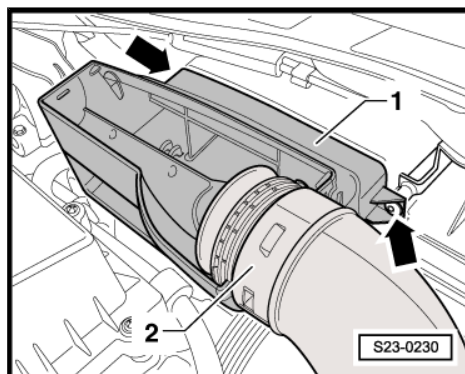
- ◆ Pliers for spring-type clips

Removing

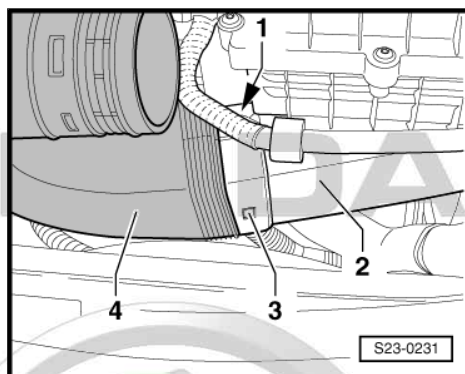
- Remove cover for air intake connection, to do so release lateral retaining clasps -arrows-.



- Unscrew screws -arrows- for air inlet -1- and take connecting hose-2- out of the guide.



- Press in catches -1- and -3- and remove air intake hose -4- from air filter -2-.



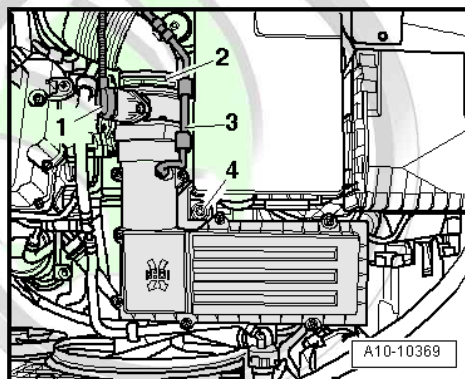
- Unplug connector -1- from air mass meter - G70- .
- Detach vacuum hose -3- and intake hose -2-.
- Slacken screw -4- and remove air filter housing.

Remove intake hose



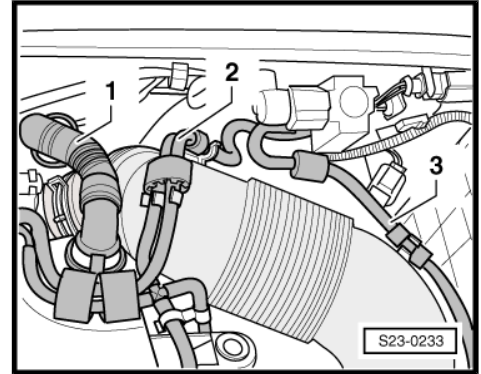
Note

Due to the poor access of the pliers for spring strap clips at the bottom suction tube, it is preferable to remove the connecting piece from the exhaust gas turbocharger.



- Remove engine cover ➤ [page 13](#) .

- Unclip hoses -2- and -3- from suction hose.
- Remove the connection pipe -1-.

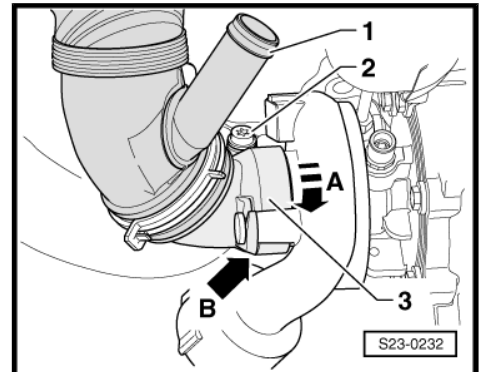


- Release screw -2-.
- Swivel the connecting piece -3- in the direction of the arrow -A- and remove it with the intake hose -1-.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- When attaching the connection fitting -3- at the exhaust gas turbocharger make sure that the connection fitting is correctly seated on the bolt of the exhaust gas turbocharger -arrow B-.



1.10 Removing and installing the engine speed sender - G28-

Special tools and workshop equipment required

- ◆ Hose clamps up to Ø 25 mm - MP7-602 (3094)-
- ◆ Assembly tool - T10118-

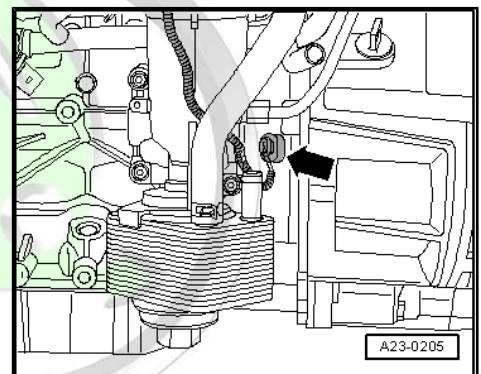
Removing

- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Unclip the coolant hoses at the engine oil cooler with hose clamps and remove the coolant hoses.
- Remove oil filter holder ⇒ [page 86](#) .
- Remove the plug -arrow- on the engine speed sender - G28- with the assembly device - T10118- and lay the electrical cable to the side.



Note

To unlock the plug without using the assembly device - T10118- , the unlock button must be pressed at the plug using a screwdriver and at the same time unlock the unlock button with a thin wire hook.





- Unscrew the fixing screw -2- for the engine speed sender - G28- -1-.

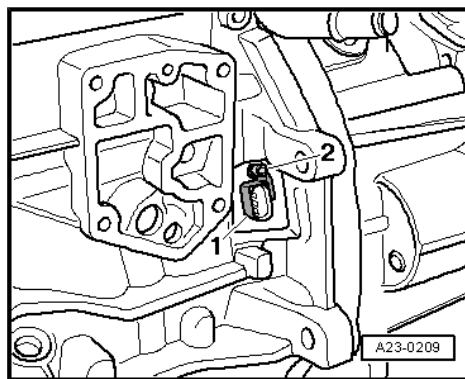
Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- Install oil filter holder ⇒ [page 86](#) .

Specified torque

Component	Nm
Engine speed sender - G28- on the sealing flange	5



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2 Engine control unit

2.1 Removing and installing engine control unit

Note

If the engine control unit should be replaced, connect vehicle diagnosis, measurement and information system - VAS 5051- and in the guided fault detection system carry out "replace engine control unit".

Special tools and workshop equipment required

- ◆ Body saw e.g. -V.A.G 1523 A-

Removing

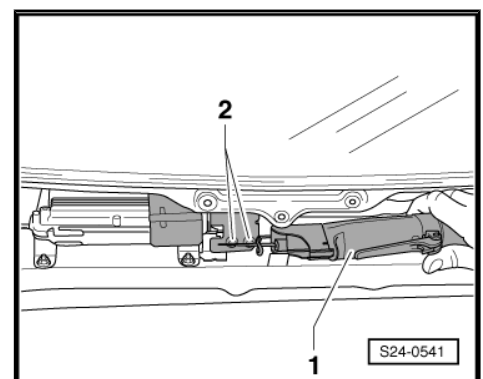
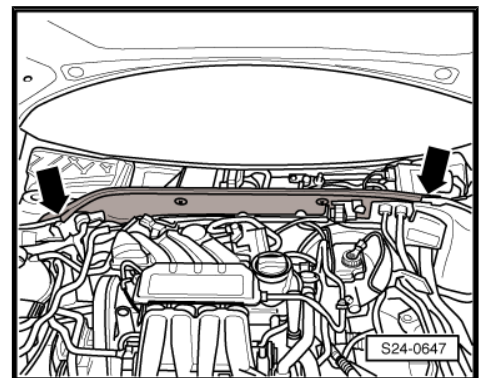
- Switch off ignition.
- Remove the cooling water tank cover ⇒ Body Work ⇒ Rep. gr. 66 .
- Remove bulkhead plenum chamber -arrows-.
- Remove windscreen wiper and washer system ⇒ Electrical System ⇒ Rep. gr. 92 .

For vehicles with protective housing

- Cut with body saw -1- a slot for the cross-head screwdriver in the heads of the pull-off screws -2-.

Note

- ◆ *It must be sawed twice with the body saw, so that the slot is wide enough, in order to unscrew the screws with a suitable screwdriver.*
- ◆ *The pull-off screws until are inserted with locking agent.*
- Unscrew bolts -2-.

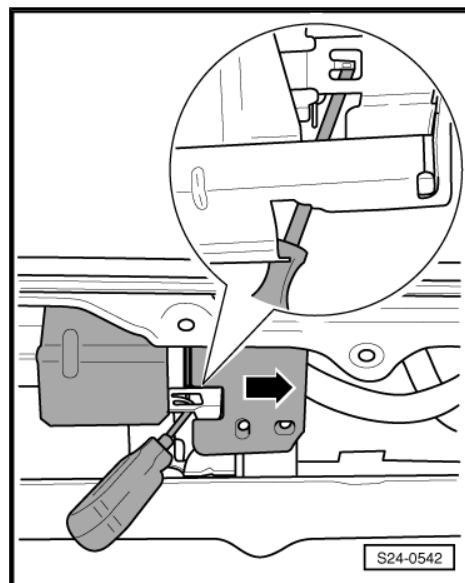




- Lift locking tab of protective cover with a cross-head screw-driver.
- Push the protective cover in the -direction of the arrow- out of the bracket for engine control unit.

Continued for all vehicles

- Disconnect front plug -1- and remove from engine control unit.



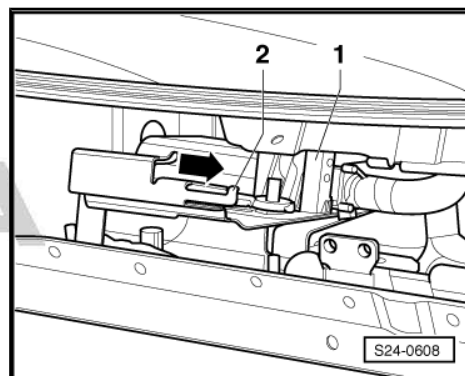
- Lever off retaining bracket -2- slightly.
- Push engine control unit out of the bracket -arrow-.
- Disconnect rear plug and remove from engine control unit.

Installing



Note

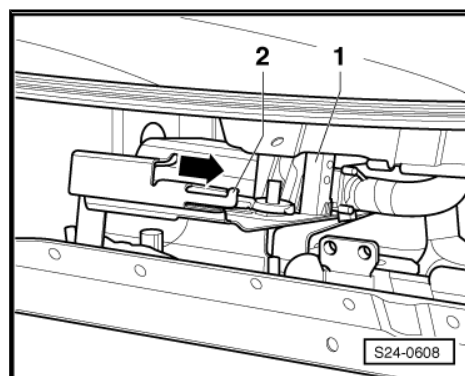
For vehicles with protective cover, the metal swarfs must be suctioned out of the plenum chamber before installing the engine control unit.



- Connect rear plug to engine control unit and lock.
- Push engine control unit into the bracket and lock the retaining bracket -2-.
- Connect front plug to engine control unit and lock.

For vehicles with protective housing

- Fasten protective cover with new pull-off screws (before tightening align the protective cover in such a way that it does not come into contact with the surrounding components)



Continued for all vehicles

- Install windscreen wiper and washer system ⇒ Electrical System ⇒ Rep. gr. 92 .
- Install bulkhead plenum chamber and plenum chamber cover ⇒ Body Work ⇒ Rep. gr. 66.

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26 – Exhaust system

1 Removing and installing parts of the exhaust system



Note

- ◆ The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.
- ◆ Replace the gaskets and the self-locking nuts.
- ◆ When performing installation work on the exhaust system, make sure the exhaust system is not mounted under tension and has adequate clearance from the vehicle body. If necessary, slacken the clamping sleeve and align the exhaust system so as to create all round adequate clearance to the body and so that the weight is evenly distributed over the hangers.

1.1 Summary of components

1 - Exhaust gas pressure sensor 1 - G450-

2 - Mounting bracket

- ☐ for pressure lines

3 - Pressure line - 45 Nm

4 - 10 Nm

5 - Lambda probe - G39- , 50 Nm

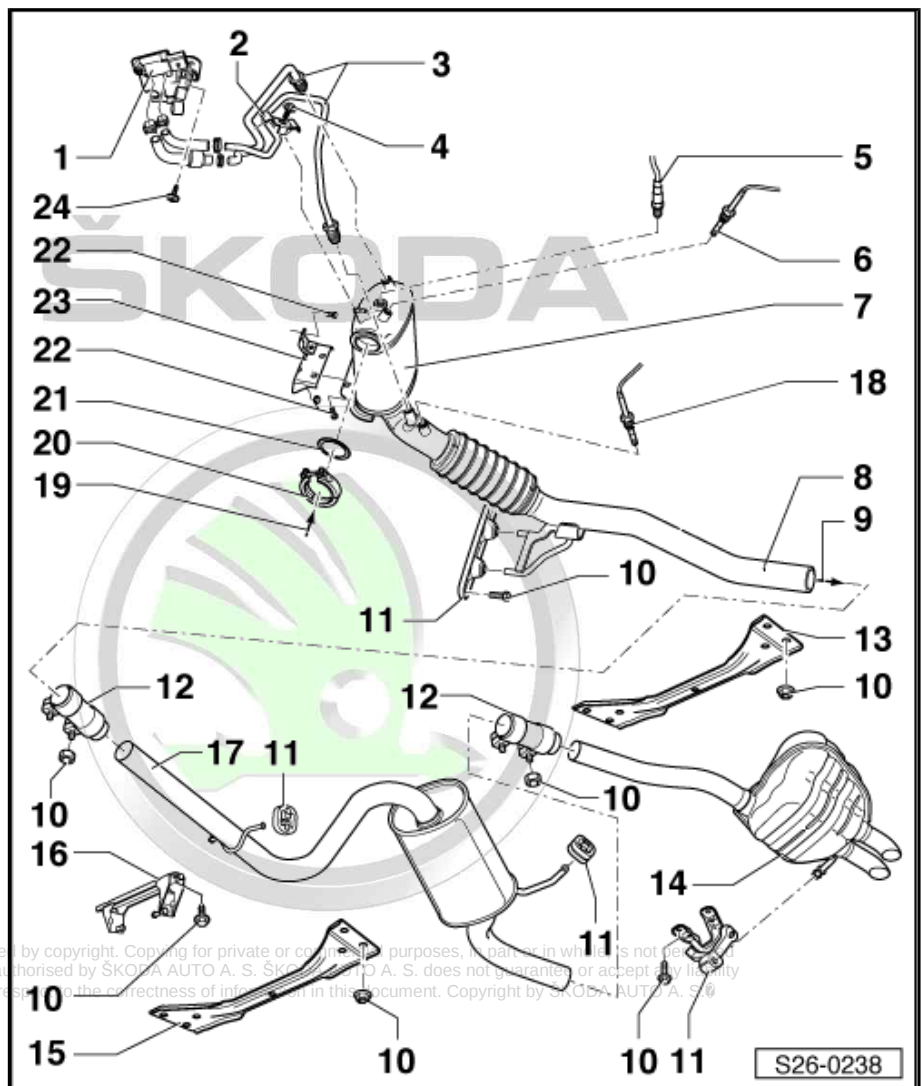
- ☐ the thread of new lambda probes must be coated with assembly paste
- ☐ for re-used lambda probe, only coat the thread with hot bolt paste - G 052 112 A3- ; the hot bolt paste - G 052 112 A3- must not get into the slots of the probe body

6 - Exhaust gas temperature sender 2 - G448- (Temperature sender upstream particle filter - G506-)

- ☐ 45 Nm
- ☐ the thread of new temperature transmitters must be coated with assembly paste
- ☐ Grease only the thread with hot bolt paste - G 052 112 A3- for re-used temperature sender.

7 - Pre-exhaust pipe with diesel particle filter

- ☐ Removing and installing ⇒ [page 154](#)





8 - Identification

- ☐ for front clamping sleeve

9 - to middle part of exhaust system

10 - 23 Nm

11 - Retaining strap

- ☐ Replace if damaged.
- ☐ Pay attention to the part number

12 - Clamping sleeve

- ☐ align exhaust system free of stress before fitting on ➔ [page 158](#)
- ☐ Tighten screwed connections uniformly

13 - Front tunnel bridge

14 - Rear part of exhaust system

- ☐ for first equipment building unit with middle part of exhaust gas system, replace individually when carrying out repairs
- ☐ Replace ➔ [page 157](#)
- ☐ Installing the exhaust system without tension ➔ [page 158](#)

15 - Rear tunnel bridge

16 - Shackle

17 - Middle part of exhaust system

- ☐ for first equipment building unit with rear part of exhaust gas system, replace individually when carrying out repairs
- ☐ Replace ➔ [page 157](#)
- ☐ Installing the exhaust system without tension ➔ [page 158](#)

18 - Exhaust gas temperature sender 3 - G495- (Temperature sender downstream particle filter - G527-)

- ☐ 45 Nm
- ☐ the thread of new temperature transmitters must be coated with assembly paste
- ☐ Grease only the thread with hot bolt paste - G 052 112 A3- for re-used temperature sender.

19 - from exhaust turbocharger

20 - Warm-type clamp - 7 Nm

- ☐ replace

21 - Gasket

- ☐ replace
- ☐ Check fitting position

22 - 23 Nm

23 - Mounting bracket

- ☐ screwed onto the cylinder block

24 - 8 Nm

1.2 Removing and installing pre-exhaust pipe with diesel particle filter

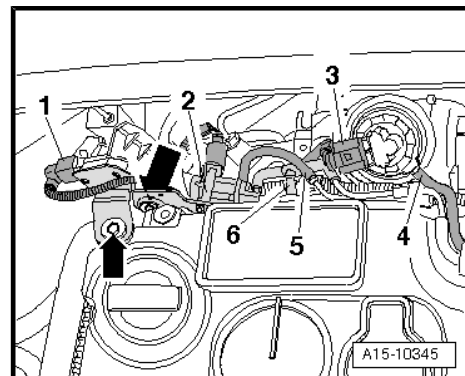
Special tools and workshop equipment required

- ◆ Support device for engine - MP3-470 (3300 A)-
- ◆ Lambda probe open ring spanner set
- ◆ Pliers for spring-type clips
- ◆ Hot bolt paste - G 052 112 A3-

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Removing

- Remove engine cover ⇒ [page 13](#) .
- Loosen change-over valve for exhaust gas recirculation radiator - N345- -2- at the bracket..
- Disconnect the plug connection -1- and expose electrical cable.
- Unscrew screws -arrows-.

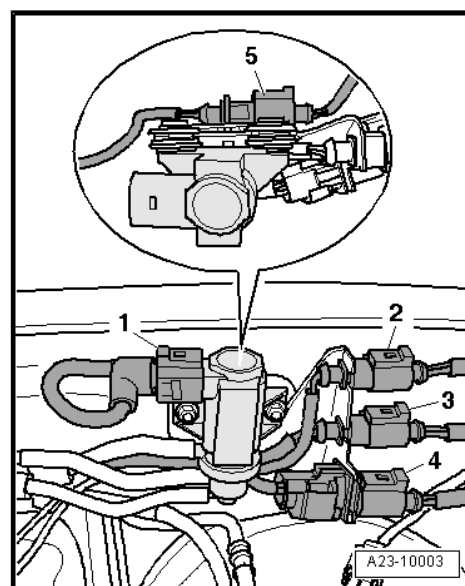


- Disconnect the following connectors on the bulkhead and expose the cable:

2 - Plug (orange) for exhaust gas temperature sender 3 - G495- (temperature sender downstream particle filter - G527-)

4 - Plug (black) for lambda probe - G39- with heating for lambda probe - Z19-

5 - Plug (brown) for exhaust gas temperature sender 2 - G448- (temperature sender upstream of particle filter - G506-)



- Unscrew lambda probe - G39- -3- and exhaust gas temperature sender 2 - G448- (temperature sender upstream from particle filter - G506-) -5-.

- Unscrew holder -2- for pressure lines and pressure line -4-.

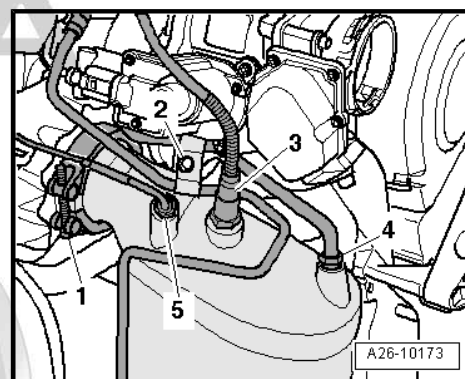
- Undo and remove clip -1- for diesel particulate filter.

- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .

Vehicles with auxiliary heating

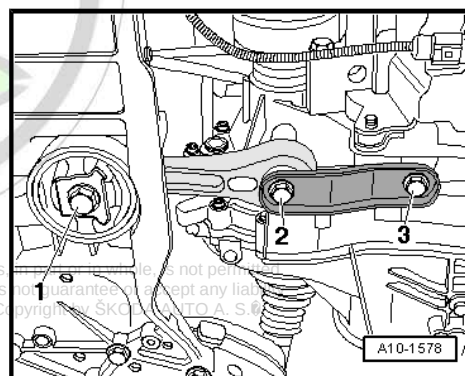
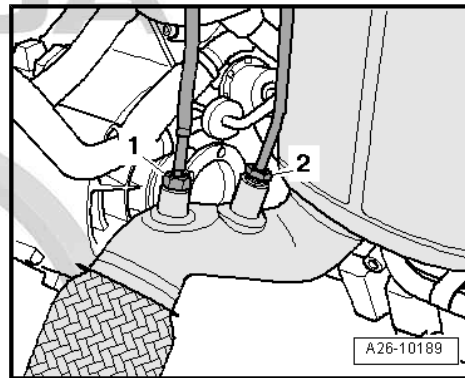
- Remove exhaust pipe of auxiliary heating ⇒ Heating, air conditioning ⇒ Rep. gr. 82 .

Continued for all vehicles

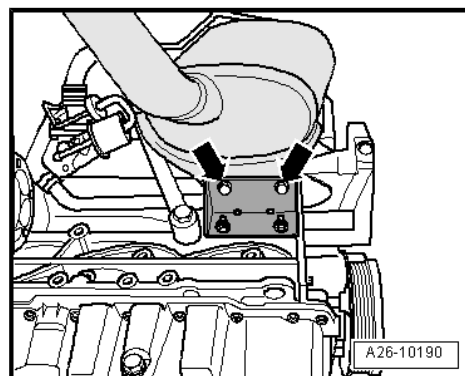




- Unscrew exhaust gas temperature sender 3 - G495- (temperature sender downstream from particle filter - G527-) -1- and pressure tube -2-.
- Remove exhaust gas pressure sender 1 - G450- and remove pressure lines.
- Unbolt heat shield for right drive shaft.
- Unscrew the right drive shaft from the gearbox flange and place to the front.
- Unscrew the screws -2- and -3- of the pendulum support.



- Release screws -arrows- at holder for diesel particle filter.

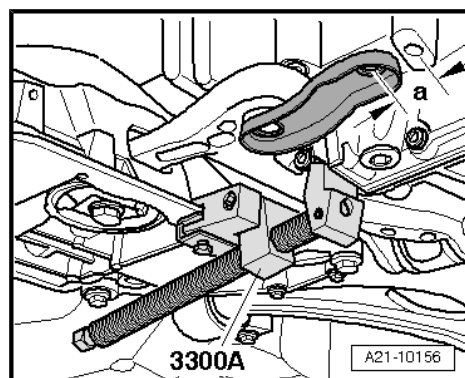


- Move engine/gearbox assembly forwards by -a- using the support device for engine - 3300 A- .
- Dimension -a-: 25 mm



Caution

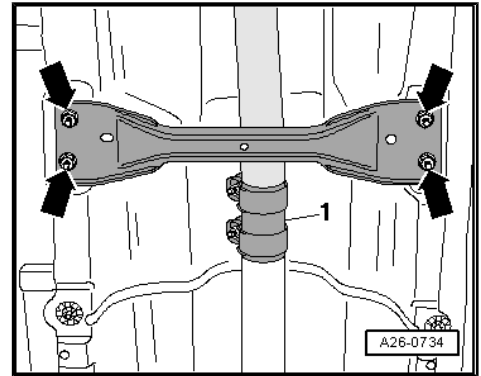
The charge air pipe must not hit the radiator fan.



- Remove front tunnel bridge -arrows-.
- Slacken clamping sleeve -1-.

i Note

The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.

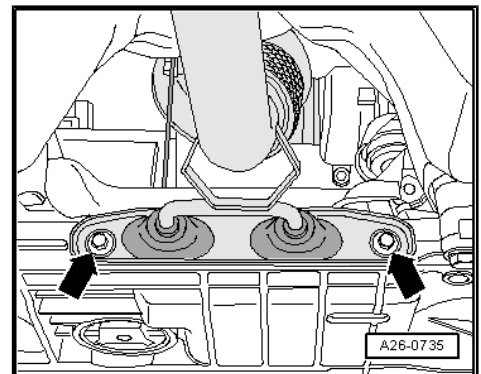


- Unbolt bracket for exhaust system -arrows-.
- Remove the diesel particulate filter by turning it 180° clockwise.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ◆ Replace gasket and clamp for diesel particle filter.
- ◆ Tightening torques ➔ [page 153](#) .
- First fasten the diesel particle filter loosely to the exhaust gas turbocharger and then fasten to the bottom bracket.
- Align exhaust system free of stress ➔ [page 158](#) .



After replacing the diesel particle filter, an adaption must be performed in the function "Targeted functions" ➔ Vehicle diagnostic tester.

1.3 Replacing middle or rear part of the exhaust system

Special tools and workshop equipment required

- ◆ Body saw , e.g. -V.A.G 1523 A- or chain pipe cutter , e.g. -VAS 6254-
- ◆ Protective goggles

Work procedure

i Note

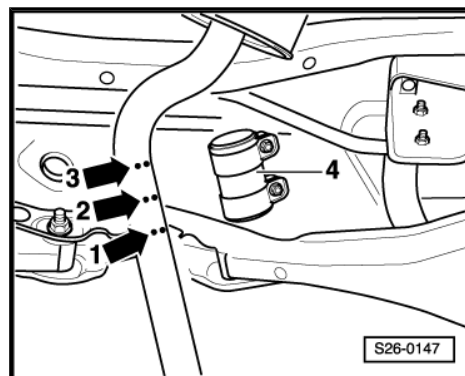
- ◆ *For individually replacing the middle or rear part of the exhaust system, a separation point is provided in the connecting pipe.*
 - ◆ *The separation point is marked by indentations on the circumference of the exhaust pipe.*
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WARNING

To avoid injury from metal shavings, wear eye protection and protective clothing.

- Separate exhaust pipe with body saw at right angles at the separation point -arrow 2-.
- When installing, position rear clamping sleeve -4- at the side markings -arrow 1- and -arrow 3-.
- Turn the rear clamping sleeve -4- in such a way that the ends of the screws are as far upwards as possible.
- Align rear part of exhaust system horizontally and tighten rear clamping sleeve to 23 Nm.
- Align exhaust system free of stress ⇒ [page 158](#) .

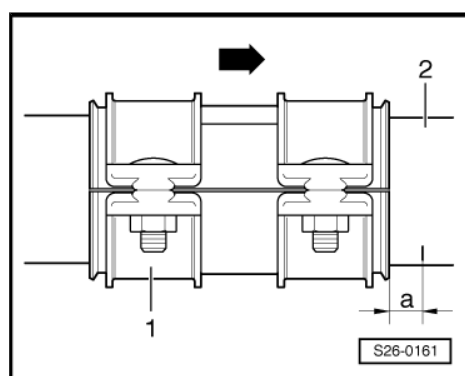


1.4 Align exhaust system free of stress

- The exhaust system is aligned when cold.
- Slacken front clamping sleeve -1- and align to exhaust pipe -2- (-arrow- points in direction of travel).
- a- = 5 mm

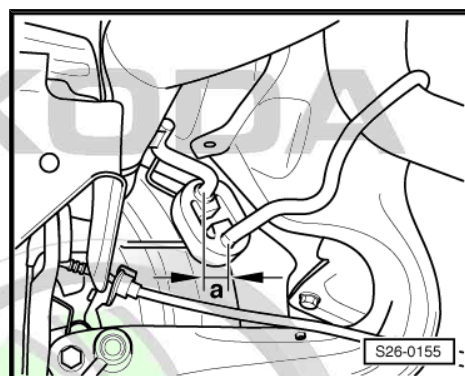
The fixing screws must be located on the right. They must not protrude beyond the bottom edge of the clamping sleeve.

- Tighten front nut by hand.



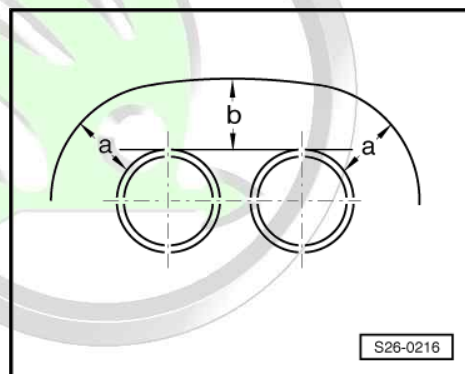
- Push the exhaust system so far forward until the preload on the retaining strap at the middle part of the exhaust system -a- = 9...11 mm.
- Tighten the nuts of the front clamping sleeve evenly to 23 Nm.

Align exhaust tailpipes



- Align rear part of exhaust system:
- There must be an equal distance -a- between bumper opening and exhaust tailpipe.
- The distance -b- from the bumper opening to the exhaust tailpipes is equal.

For aligning, loosen the hangers of the exhaust gas system.



1.5 Inspecting the exhaust system for leaks

- Start engine and run in idle.
- Seal off exhaust tailpipes for the duration of the leak check (e.g. with cloth or plug).

- Inspect connection points of cylinder head/exhaust manifold, exhaust gas turbocharger/pre-exhaust pipe etc. for leaktightness by listening and visual inspection.
- Eliminate any leak found.

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2 Exhaust gas recirculation system



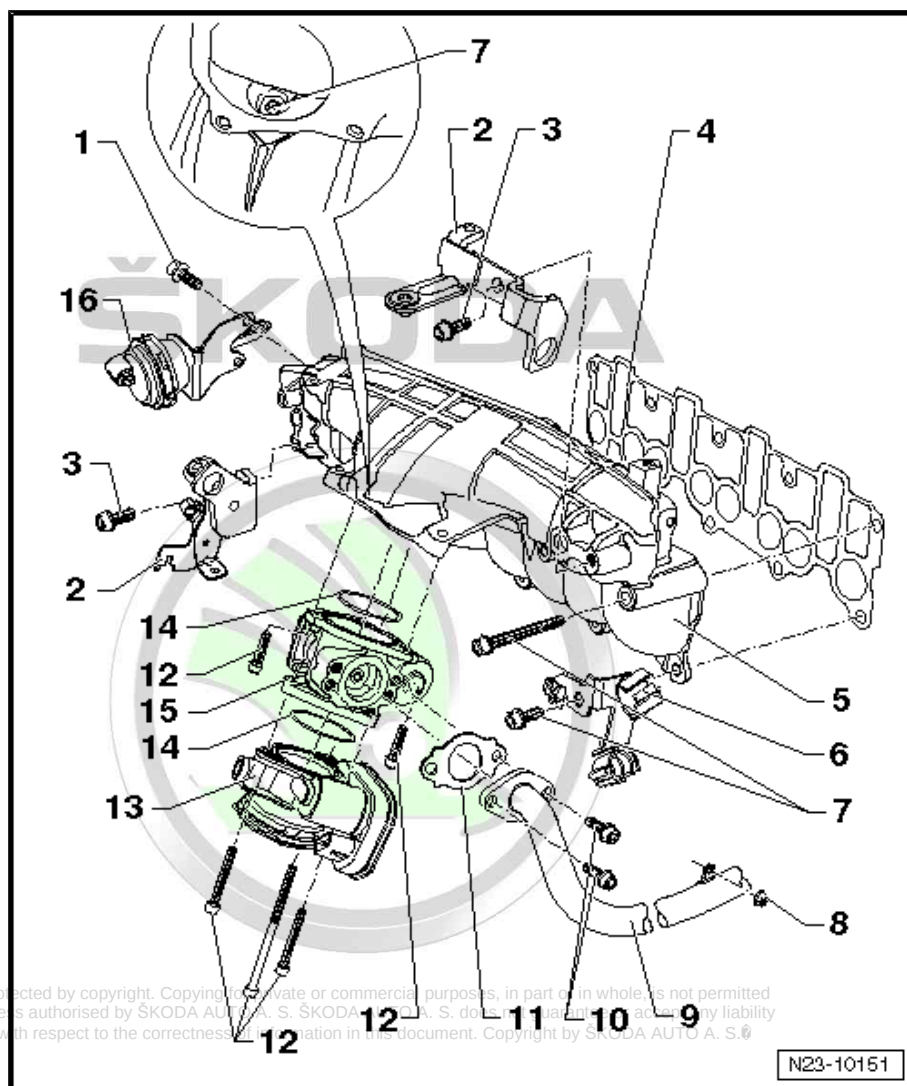
Note

- ◆ The exhaust gas recirculation system is operated by the diesel direct injection system control unit - J248- for EGR valve - N18-.
- ◆ The EGR valve - N18- consists of the mechanical valve, the EGR control motor - V338- and the EGR potentiometer - G212-.
- ◆ The electrically operated valve with cone-shaped valve plunger makes it possible to achieve different opening cross-sections at different opening strokes.
- ◆ Replace self-locking nuts.

2.1 Exhaust gas recirculation system - Summary of components

- 1 - 10 Nm
- 2 - Mounting bracket
- 3 - 22 Nm
- 4 - Gasket
 - ☐ replace
- 5 - Intake manifold
 - ☐ with airflow control
- 6 - Cable strap
- 7 - 22 Nm
- 8 - 10 Nm
- 9 - Connecting pipe
 - ☐ to radiator for exhaust gas recirculation
- 10 - 22 Nm
- 11 - Gasket
 - ☐ replace
- 12 - 10 Nm
- 13 - Intake manifold flap motor - V157-
 - ☐ The intake manifold flap is closed for about 3 seconds after switching off the engine and then opens again. This reduces the switch-off impact.
- 14 - O-ring
 - ☐ replace
- 15 - Exhaust gas return valve - N18-
 - ☐ consists of:

- ◆ mechanical valve (electrically operated)



- ◆ Exhaust gas recirculation control motor - V338-
- ◆ Exhaust gas recirculation potentiometer - G212-

16 - Vacuum setting element

- ☐ for airflow control

2.2 Radiator for exhaust gas recirculation - summary of components

1 - 22 Nm

2 - Connection pipe for exhaust gas recirculation

- ☐ to exhaust gas recirculation valve - N18-

3 - Gasket

- ☐ replace

4 - 10 Nm

5 - from exhaust manifold

6 - 25 Nm

- ☐ replace

7 - Connecting pipe

8 - Radiator for exhaust gas recirculation

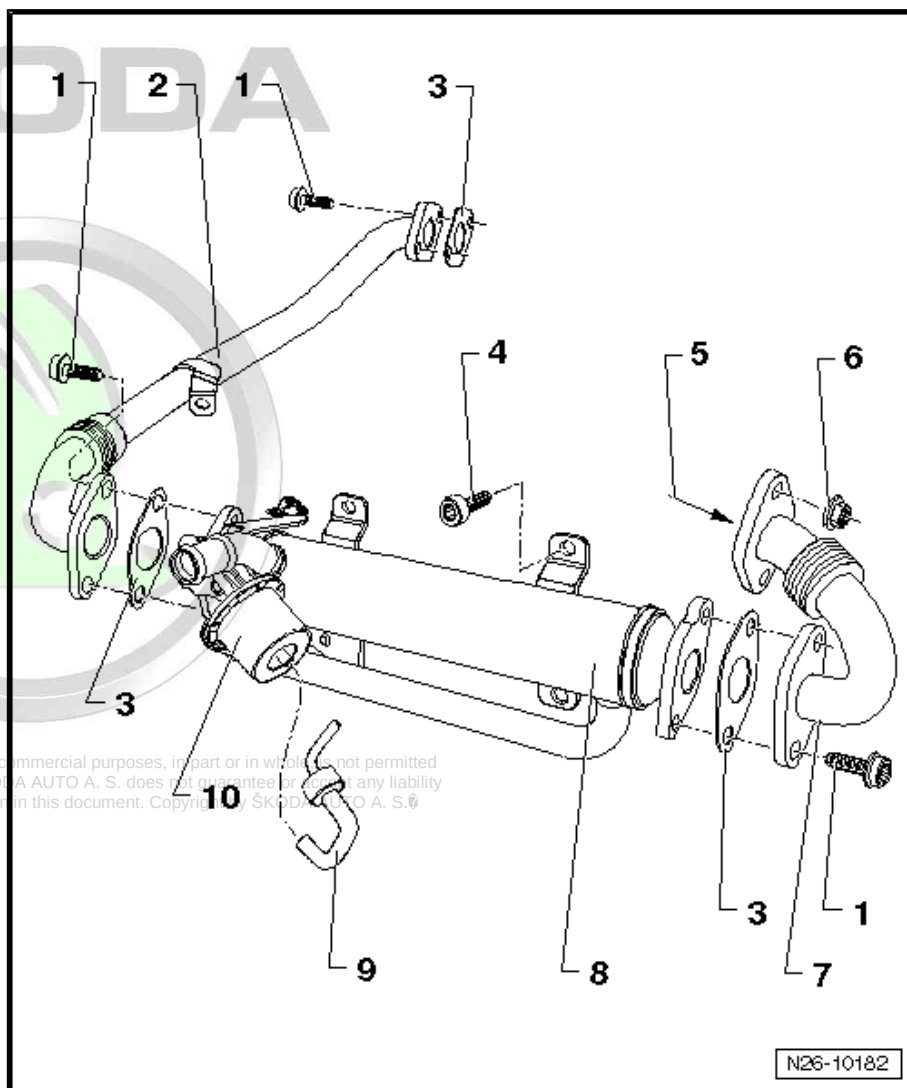
- ☐ with change-over flap
- ☐ Check change-over of radiator for exhaust gas recirculation
⇒ [page 162](#)
- ☐ Removing and installing
⇒ [page 163](#)

9 - Vacuum hose

- ☐ Connection diagram for vacuum hoses
⇒ [page 162](#)

10 - Vacuum setting element

- ☐ for change-over flap
- ☐ always replace together with radiator for exhaust gas recirculation





2.3 Connection diagram for vacuum hoses

1 - Air filter housing

- ☐ With connection for ventilation line of the charge pressure control solenoid valve - N75-

2 - Solenoid valve for charge pressure control - N75-

3 - Cylinder head cover

- ☐ with vacuum unit

4 - Non-return valve

- ☐ Check fitting position

5 - Vacuum line to brake booster

6 - Changeover valve for radiator of exhaust gas recirculation - N345-

7 - Valve for intake manifold flap - N316-

8 - Vacuum setting element

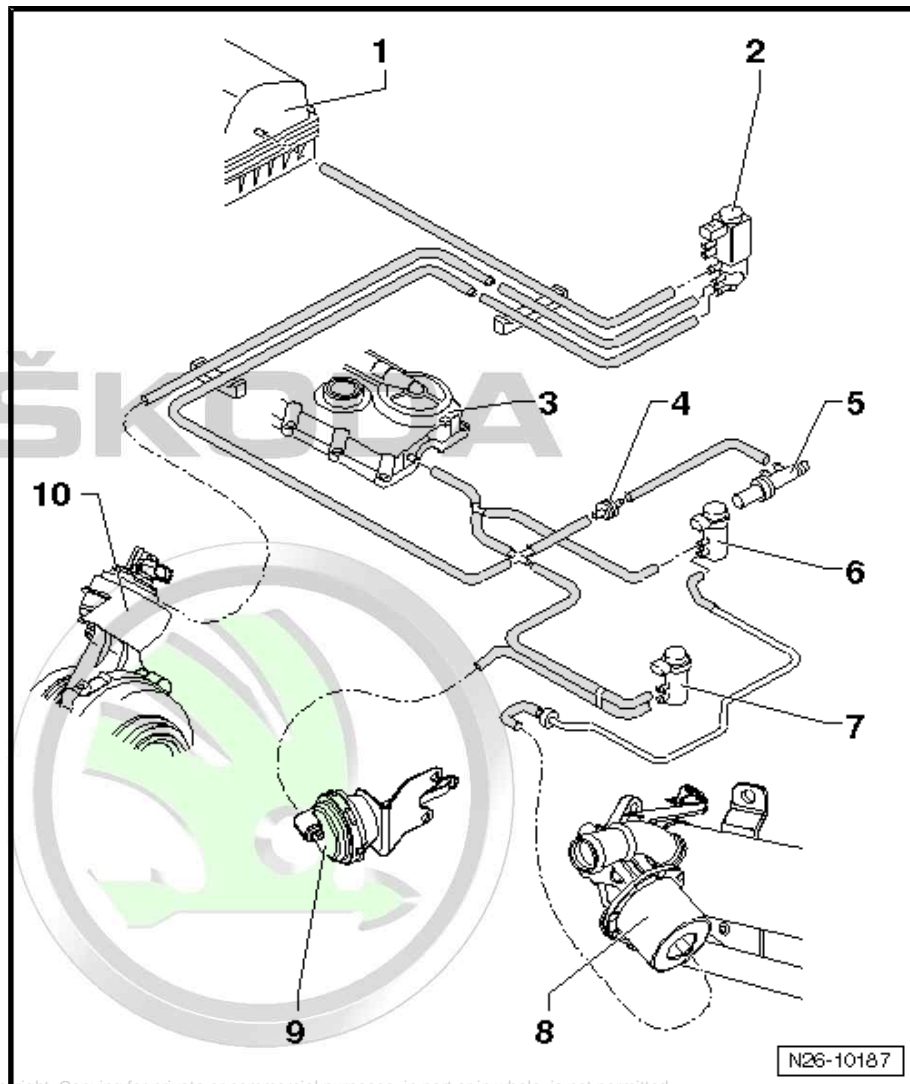
- ☐ for changeover of radiator for exhaust gas recirculation

9 - Vacuum setting element

- ☐ for airflow control

10 - Vacuum setting element

- ☐ at exhaust gas turbo-charger
- ☐ for position sender for charge pressure regulator - G581-



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2.4 Check changeover of radiator for exhaust gas recirculation

Special tools and workshop equipment required

- ◆ Hand vacuum pump , e.g. -VAS 6213-

Work procedure

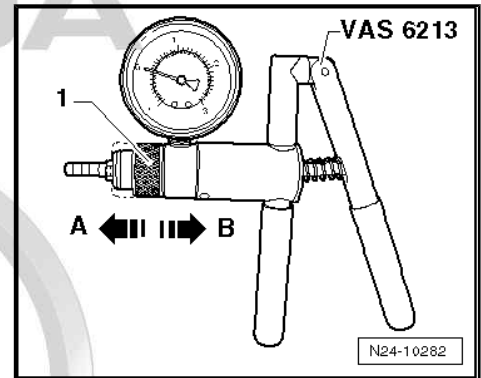


Note

The vacuum setting element for change-over flap is accessible from below.

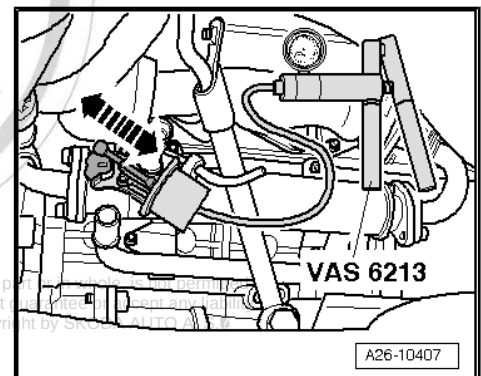
- Remove noise insulation ⇒ Body Work ⇒ Rep. gr. 50 .
- Unbolt heat shield for right drive shaft.

- 3 Put the sliding ring -1- of the hand vacuum pump - VAS 6213- in position -A- for “vacuum”



- Detach vacuum hose from vacuum setting element.
- Connect hand vacuum pump to vacuum setting element.
- Operate the hand vacuum pump several times.
- The vacuum setting element must open the change-over flap up to the stop at maximum 0.08 MPa (0.8 bar) negative pressure and in case of ventilation close it up to the stop -arrows-.

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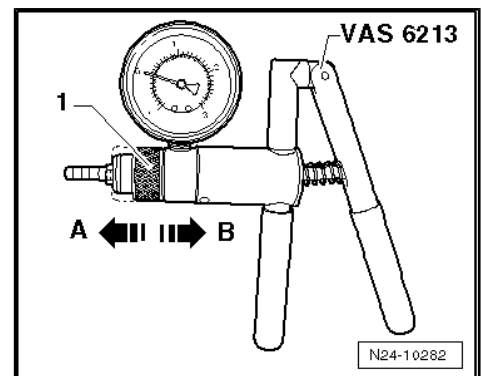


Note

- ◆ For this test the opening of the change-over flap can be performed in jolts. In driving mode the change-over flap opens suddenly due to the large negative pressure volume.
- ◆ The change-over flap must be closed abruptly when bleeding is being performed (e.g. put the sliding ring -1- of the hand vacuum pump - VAS 6213- in position -B- or remove the vacuum hose).

If the vacuum setting element does not open or close the change-over flap up to the stop:

- Replace radiator for exhaust gas recirculation with vacuum setting element ➔ [page 163](#) .



2.5 Removing and installing radiator for exhaust gas recirculation

Special tools and workshop equipment required

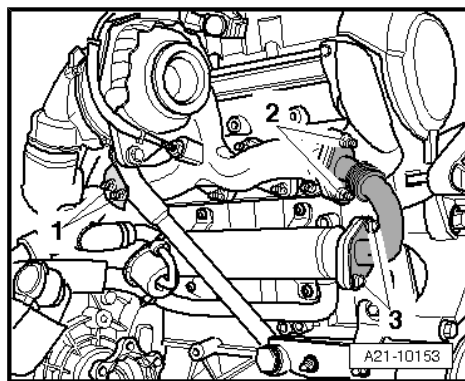
- ◆ Hose clamps up to Ø 25 mm - MP7-602 (3094)-
- ◆ Catch pan for workshop cranes , e.g. -VAS 6208-
- ◆ Pliers for spring-type clips

Removing

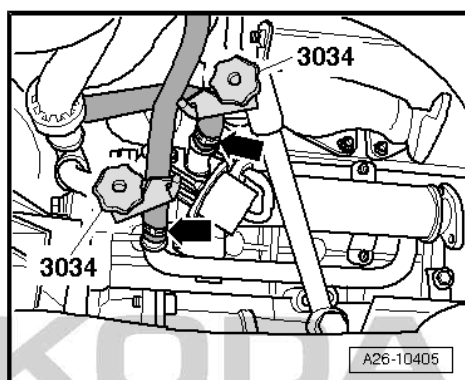
- Remove diesel particle filter ➔ [page 154](#) .



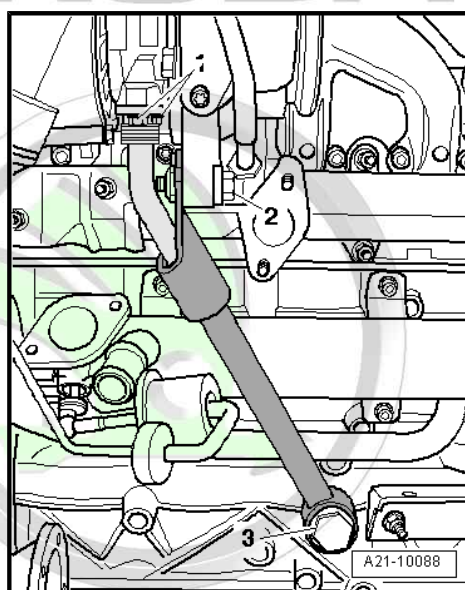
- Release nuts -2- and screws -3- and remove the connection pipe for exhaust gas recirculation.
- Place a catch pan under the engine.



- Clamp coolant hoses with hose clamps up to Ø 25 mm - 3094- and remove the radiator for exhaust gas recirculation.
- Remove heat protection sleeve from vacuum actuator.



- Unscrew screw -2- and hollow screw -3-.
- Rotate the turbocharger support 90° and pull it down and out of the oil return line.



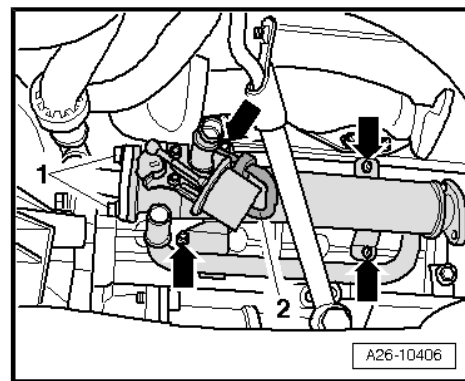
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- Release screws -1- for connection pipe for exhaust gas recirculation.
- Remove vacuum hose -2- from vacuum setting element and lay down.
- Release screws -arrows- and remove radiator for exhaust gas recirculation.

Installing

Installation occurs in reverse order to removal. Pay attention to the following:

- ◆ Replace the gaskets, the sealing rings and the self-locking nuts.
- ◆ Secure all hose connections with corresponding hose clips.
- ◆ Tightening torques ➔ [page 161](#) and ➔ [page 124](#) .
- Inspect coolant level, top up with coolant if necessary ➔ [page 96](#) .



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28 – Glow plug system

1 Glow Plug System

1.1 Removing and installing ceramic glow plugs

Special tools and workshop equipment required

- ◆ Hand-held multimeter , e.g. -V.A.G 1526 B-
- ◆ Insertion tool 8 mm
- ◆ Hose - N 020 150 5- ➔ Electronic Catalogue of Original Parts , approx. 250 mm long
- ◆ Means for loosening the screwed connections

For ceramic glow plugs the followings points must be observed:



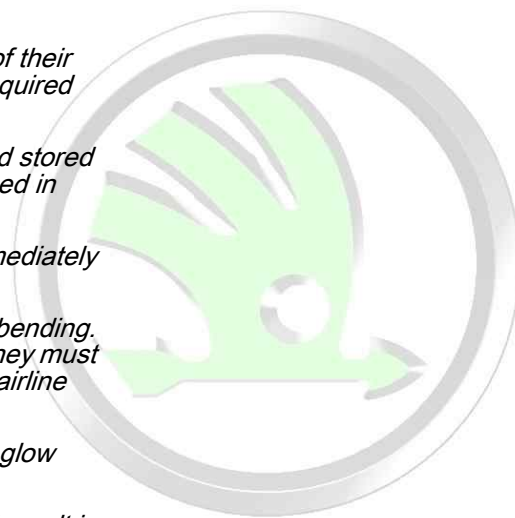
Note

- ◆ *The ceramic glow plugs are very sensitive because of their special material properties and special handling is required during removal and installation.*
- ◆ *The ceramic glow plugs must only be transported and stored in original transport containers or individually packaged in bubble wrap.*
- ◆ *Remove ceramic glow plugs from their wrapping immediately before fitting.*
- ◆ *The ceramic glow plugs are sensitive to impacts and bending. If they fall, even if from a small height of about 2 cm, they must not be used. Even if no external damage is visible, hairline cracks may be present.*
- ◆ *If in doubt about the perfect condition of the ceramic glow plugs, they must always be replaced.*
- ◆ *Damage to or breakage of the ceramic glow plug will result in engine damage.*
- ◆ *If the ceramic glow plug breaks, all fragments must be removed from the engine, as otherwise the engine may be damaged due to seizure.*
- ◆ *The ceramic glow plugs must not be removed in order to test the compression pressure.*
- ◆ *Always perform the compression pressure test with installed ceramic glow plugs in the function "guided fault finding" ➔ Vehicle diagnostic tester.*
- ◆ *The software of the engine control unit is adapted to a specific type of glow plugs (ceramic or metallic). For this reason, only appropriate glow plugs can be installed.*
- ◆ *A mixed installation of ceramic glow plugs and metallic glow plugs is not permitted.*

1.1.1 Removing

- Before removal, the ceramic glow plugs must be loosened by heating ➔ Vehicle diagnostic tester output DTM of the automatic glow period control unit - J179- ,

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- Remove cylinder head cover ⇒ [page 55](#) .
- Unplug connectors from the ceramic glow plugs.



Caution

- ◆ *When slackening the ceramic glow plug the maximum permissible torque of 20 Nm must not be exceeded.*
- ◆ *Only ever slacken ceramic glow plug with recommended plug insert and torque wrench.*

- Carefully slacken the ceramic glow plug with the plug insert -arrow-, taking care not to exceed the maximum permitted tightening torque of 20 Nm.

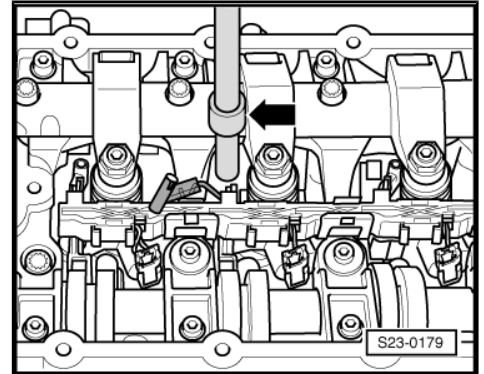
If the ceramic glow plug cannot be slackened with max. 20 Nm:

- Use commercially available tool to slacken the screwed connections and repeat the slackening procedure.



Note

- ◆ *If the ceramic glow plug cannot be slackened with a max. torque of 20 Nm even when using the tool, remove the cylinder head and then unscrew the glow plug.*
- ◆ *A ceramic glow plug removed in this way must no longer be used.*
- Place an approximately 250-mm-long hose - N 020 150 5- onto the slackened glow plug and carefully unscrew. The glow plug must not tilt.
- Pull up the unscrewed ceramic glow plug using the hose. The glow plug must not collide with anything when being pulled out.



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1.1.2 Installing



Note

The threads in the cylinder head and the ceramic glow plugs must be clean and dry and free from oil and lubricant.

- Remove deposits in the holes for ceramic glow plugs in the cylinder head.
- Screw ceramic glow plugs into the holes and tighten by hand.



Caution

- ◆ *The maximum tightening torque for ceramic glow plugs is 12 Nm and this must never be exceeded (clean and dry thread free from oil and lubricant).*
- ◆ *If the specified tightening torque is exceeded, there is a risk that the ceramic glow plug will break, which will always lead to serious engine damage.*

- Tighten ceramic glow plugs to 12 Nm with the recommended plug insert and torque wrench.

Check the condition of the installed ceramic glow plugs as follows:



- Connect hand-held multimeter for resistance measurement between contact and ceramic glow plug housing.
- Specified value: less than 1 Ω

If the specified value is exceeded (greater than 1 Ω):

- Remove ceramic glow plug and check whether it has shattered.



Caution

If the defective ceramic glow plug is broken, all broken fragments must be removed from the cylinder before the engine is started, as otherwise there will be serious engine damage. If required, the cylinder head must be removed.

- Insert the connector onto the ceramic glow plugs.
- Check the built-in ceramic glow plugs via the self-diagnosis
⇒ Vehicle diagnostic tester.



Caution

The engine must not be started as long as a fault concerning the ceramic glow plugs is stored in the event memory!

- Check electrical wiring and plug connections for ceramic glow plugs.

If these show no faults:

- Install cylinder head cover ⇒ [page 55](#) .



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